

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

5

LISTING OF CLAIMS

Claims 1-100 (canceled).

10 Claim 101. (currently amended) A CD/DVD recording medium comprising, on at least one surface, laser sensitive materials ~~selected from comprising at least one of the group consisting of~~ infrared sensitive dyes and near infrared absorbing heat sensitive dyes;  
15 wherein the at least one surface comprises at least one image recording area having at least one labeling surface, the at least one labeling surface comprising the laser sensitive materials;  
and wherein the laser sensitive materials are for labeling the at least one surface of the recording medium and not for primary data storage.

20 Claim 102. (currently amended)

Claim 103. (currently amended)

25 Claim 104. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes comprise 3'phenyl-7-diethylamino-2,2'-spirodi-(2H-1-benzopyran); IR 10000 FBK; IR 10000 FBE; IR 10000 GBK; and IR 10000 GBE.

30 Claim 105. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes comprise colorless electron donating type dry precursor compounds which react with a developer compound to generate a dye.

Claim 106. (previously presented) The recording medium of claim 105 wherein the colorless electron donating type dry precursor compound has at least one of a lactone, a lactam, a sulfone, a spiropyran, an ester or an amido structure.

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Claim 107. (previously presented) The recording medium of claim 105 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of triarylmethane compounds, bisphenylmethane compounds, xanthene compounds, xanthene compounds, thiazine compounds, spiropyran compounds and the like.

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Claim 108. (previously presented) The recording medium of claim 107 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of Crystal Violet lactone, benzoyl leuco methylene blue, Malachite Green Lactone, p-nitrobenzoyl leuco methylene blue, 3-dialkylamino-7-dialkylamino-fluoran, 3-methyl-2,2'-spirobi(benzo-f-chrome), 3,3-bis(p-dimethylaminophenyl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-methylindole-3-yl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-phenylindole-3-yl)phthalide, 3,3-bis(1,2-dimethylindole-3-yl-5-dimethylaminophthalide, 3,3-bis-(1,2-dimethylindole-3-yl)6-dimethylaminophthalide, 3,3-bis-(9-ethylcarbazole-3-yl)-5-dimethylaminophthalide, 3,3-bis(2-phenylindole-3-yl)-5-dimethylaminophthalide, 3-p-dimethylaminophenyl-3-(1-methyl pyrrole-2-yl)-6-dimethylaminophthalide, 4,4'-bis-dimethylaminobenzhydrin benzyl ether, N-halophenyl leuco Auramine, N-2,4,5-trichlorophenyl leuco Auramine, Rhodamine-B-anilinolactam, Rhodamine-(p-nitroanilino)lactam, Rhodamine-B-(p-chloroanilino)lactam, 3-dimethylamino-y-methoxyfluoran, 3-diethylamino-7-methoxyfluoran, 3-diethylamino-7-(acetylmethylamino)fluoran, 3-diethylamino-7-(dibenzylamino)fluoran, 3-diethylamino-7-(methylbenzylamino)fluoran, 3-diethylamino-7-(chloroethylmethylamino)fluoran, 3-diethylamino-7-(diethylamino)fluoran, 3-methyl-spiro-dinaphthopyran, 3,3'-dichloro-spiro-dinaphthopyran, 3-benzyl-spiro-dinaphthopyran, 3-methyl-naphtho-(3-methoxybenzo)-spiropyran, 3-propyl-spirodibenzoidipyran, and combinations thereof.

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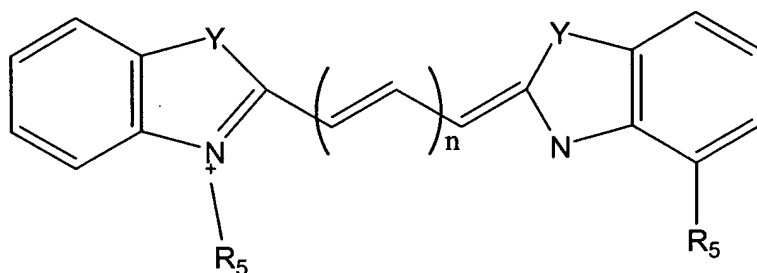
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Claim 109. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes cyanine dyes represented by the following formula (XX);

(XX)



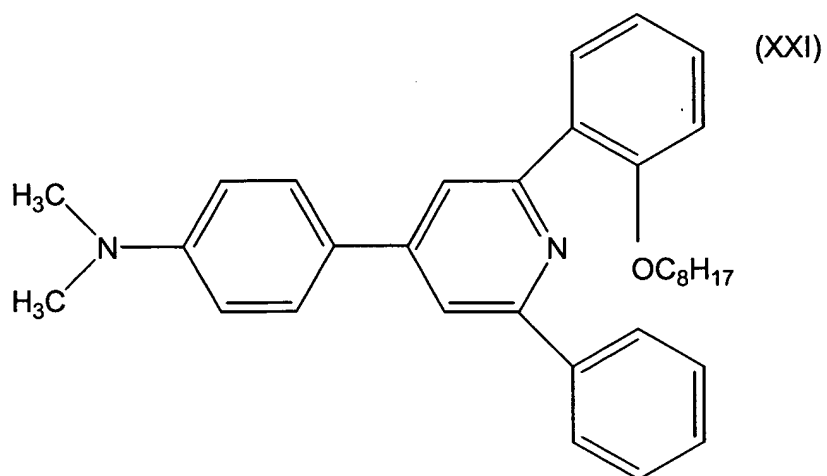
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wherein n is 0, 1, 2 or 3; R<sub>5</sub> represents an alkyl group; and Y represents CH=CH, N-CH<sub>3</sub>, C(CH<sub>3</sub>)<sub>2</sub>, O, S or Se.

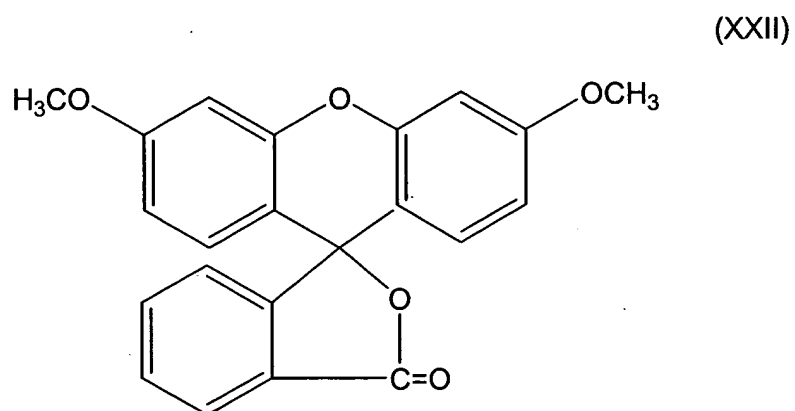
10 Claim 110. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes comprise a compound having at least one of a lactone, lactam, sulfone, spiropyran, ester, and amide structure.

Claim 111. (previously presented) The recording medium of claim 110  
 15 wherein the infrared sensitive dyes are selected from the group consisting of triarylmethane compounds, bisphenyl methane compounds, xanthene compounds, fluoran compounds, thiazine compounds and spiropyran compounds.

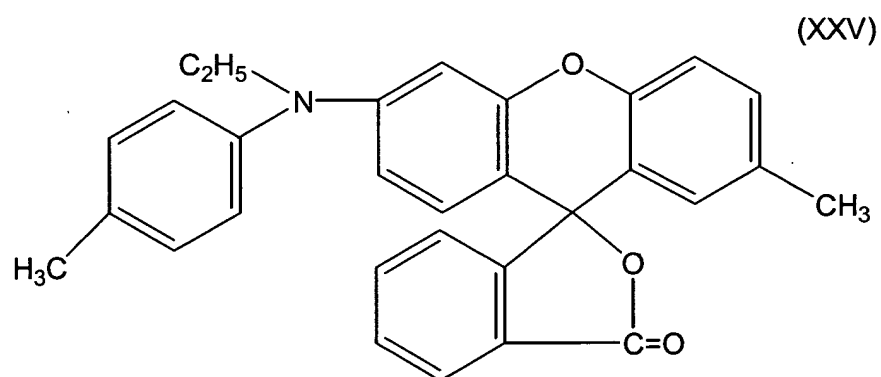
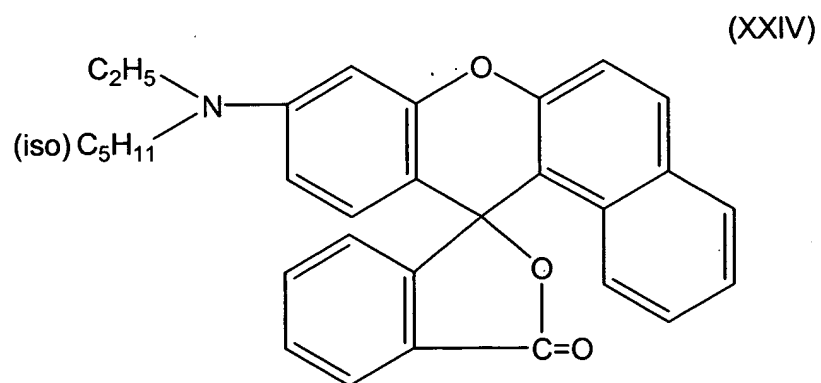
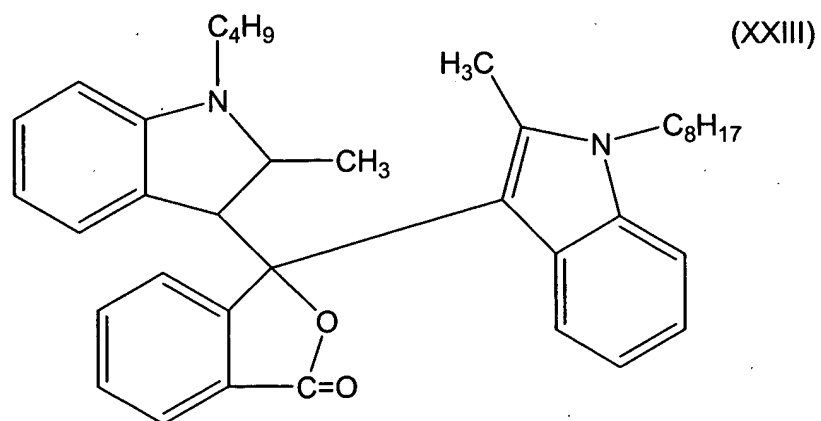
Claim 112. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes are yellow dyes selected from the group consisting of



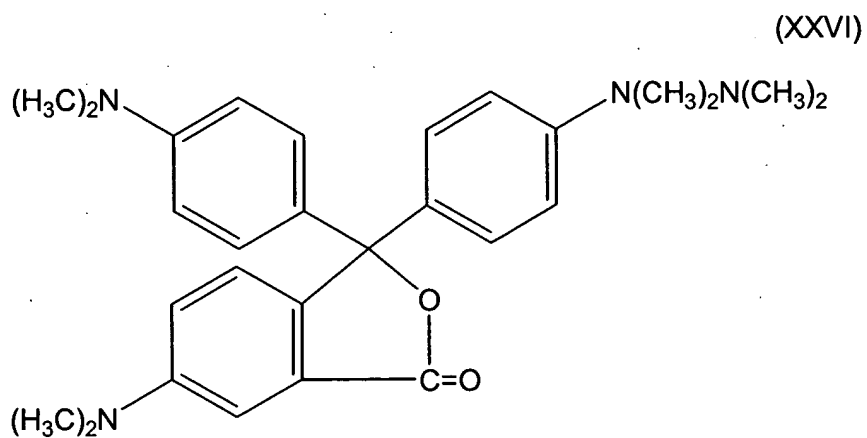
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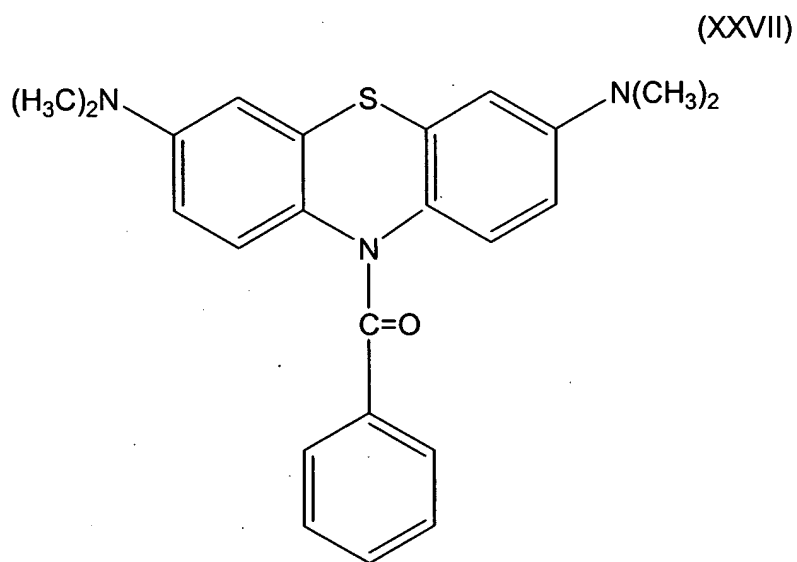
10 Claim 113. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes are Magenta dyes selected from the group consisting of



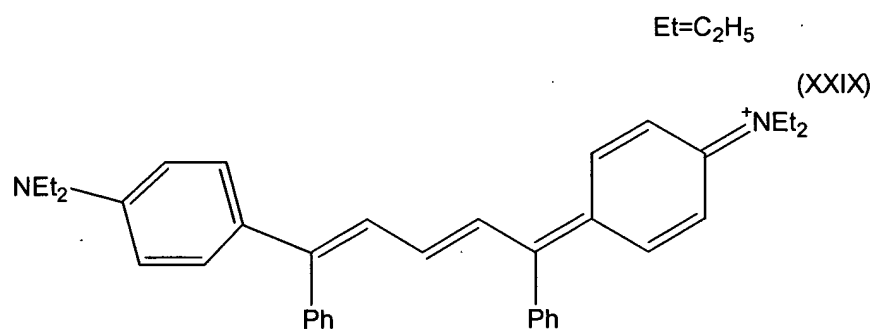
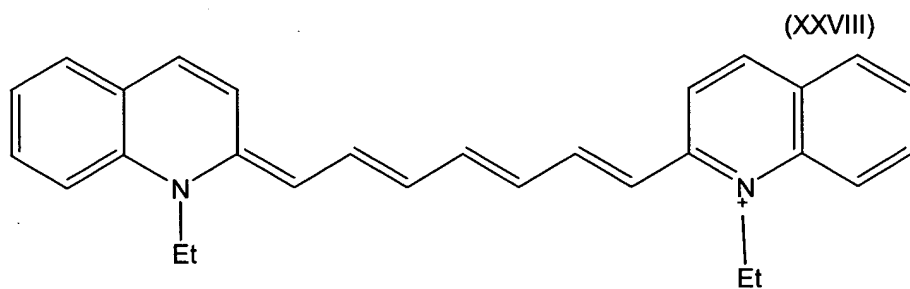
Claim 114. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes are cyan dyes selected from the group consisting of



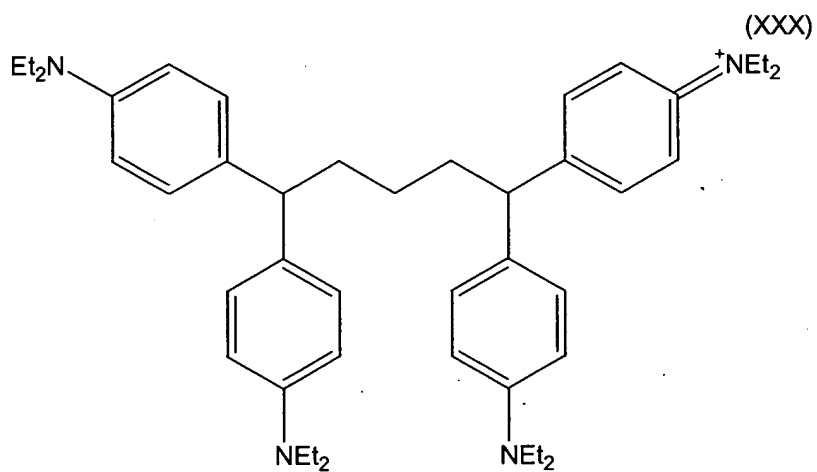
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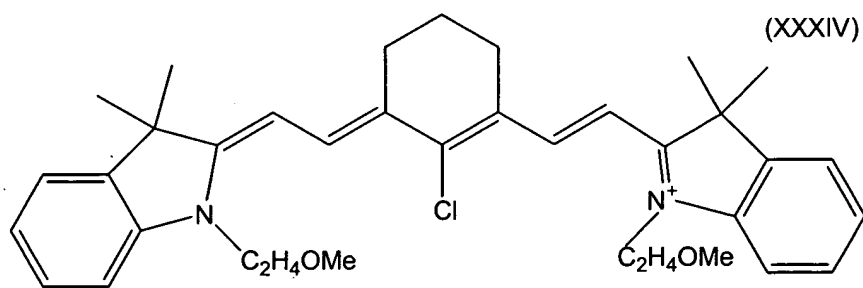
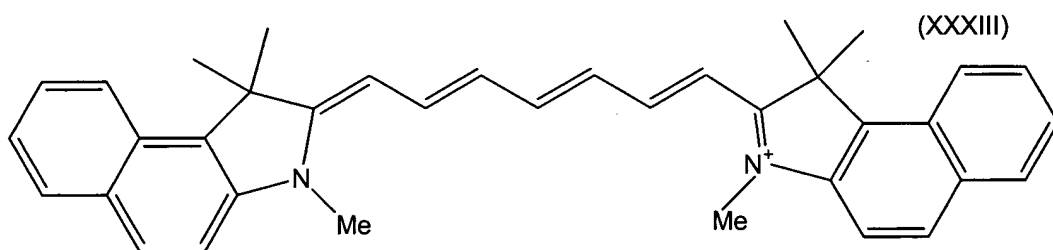
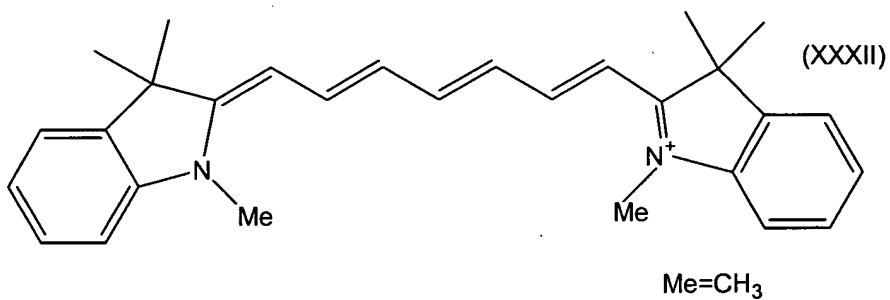
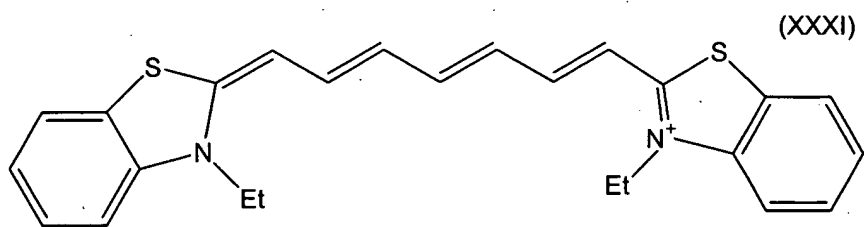


Claim 115. (previously presented) The recording medium of claim 101 wherein the infrared sensitive dyes are selected from the group consisting of

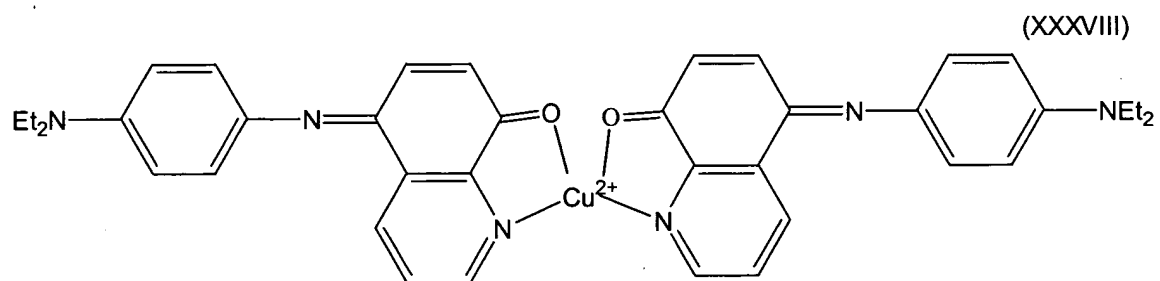
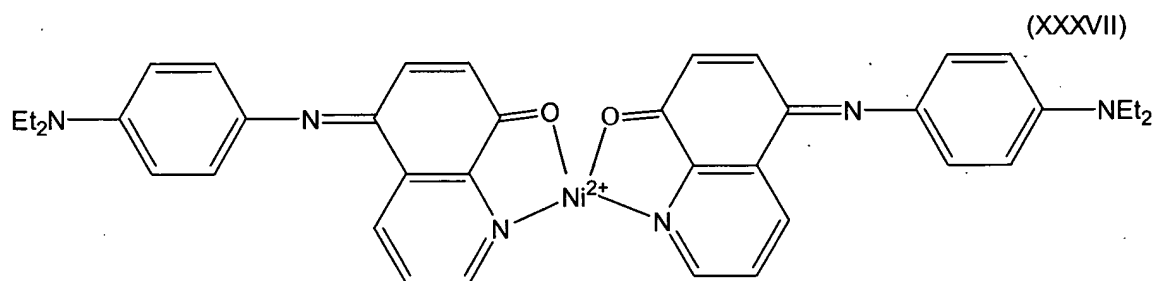
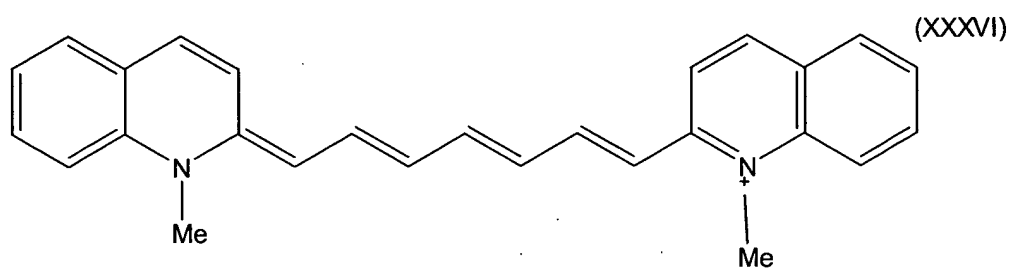
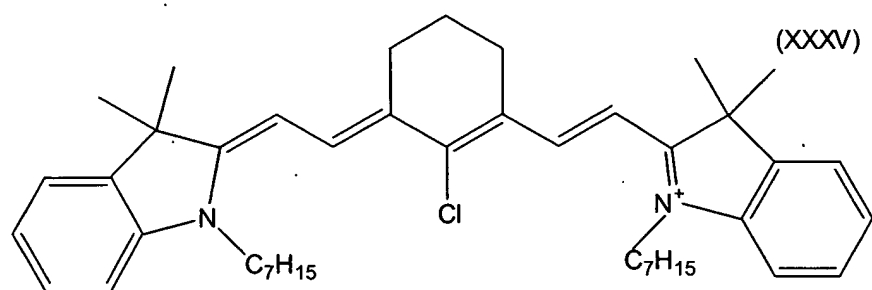


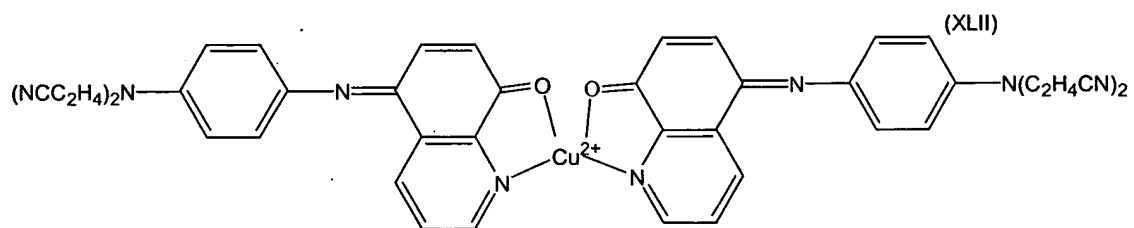
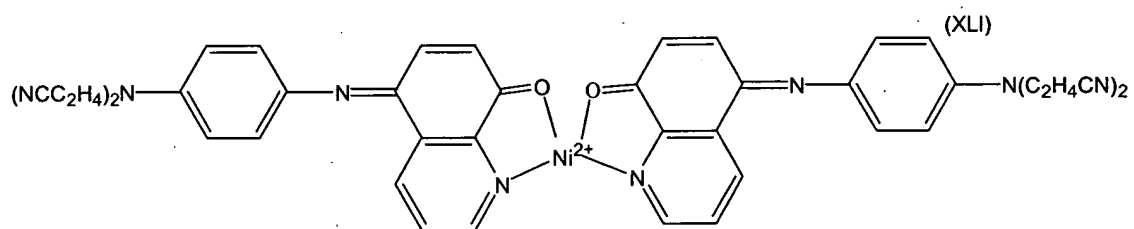
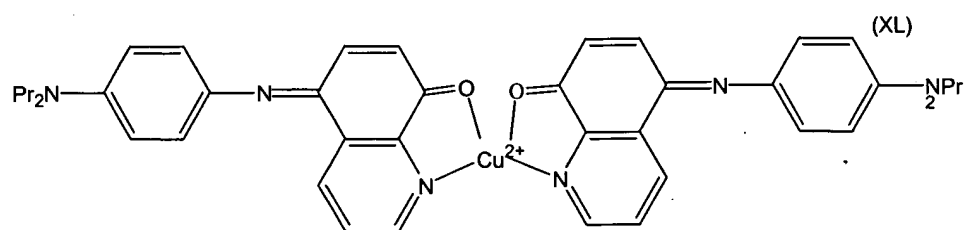
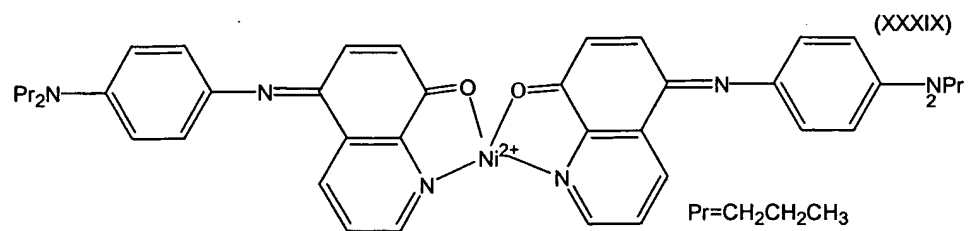
Ph=phenyl

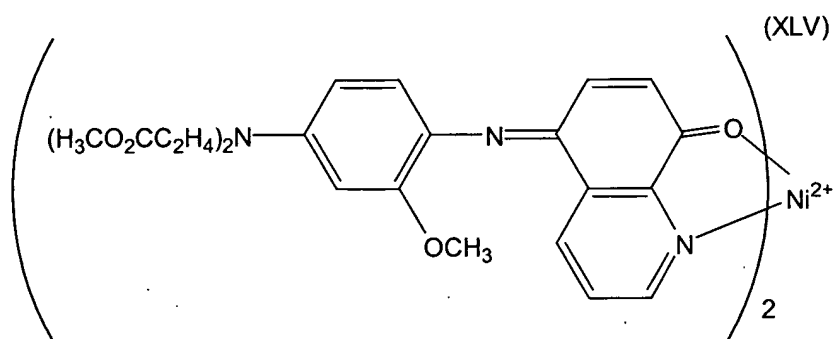
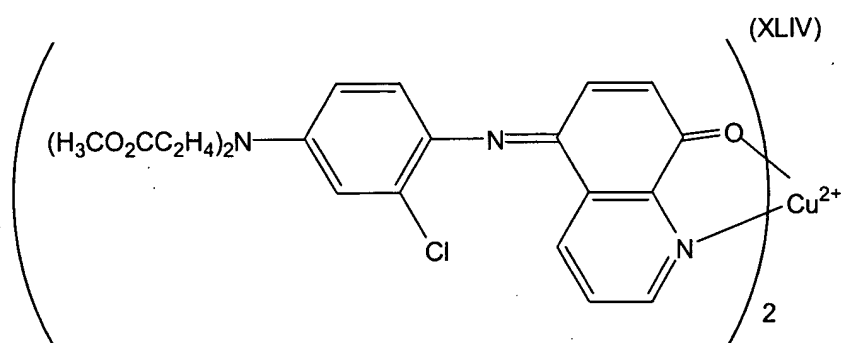
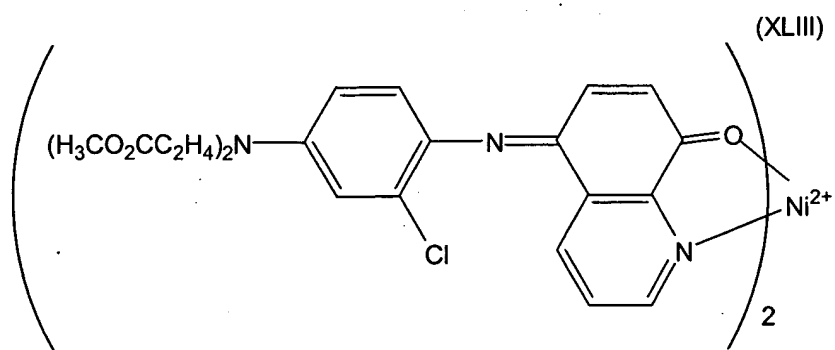


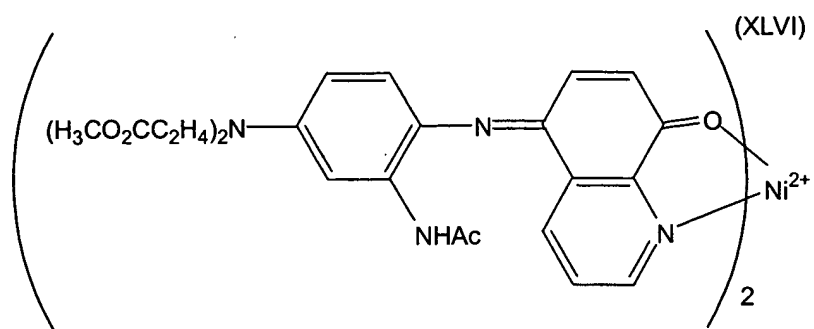




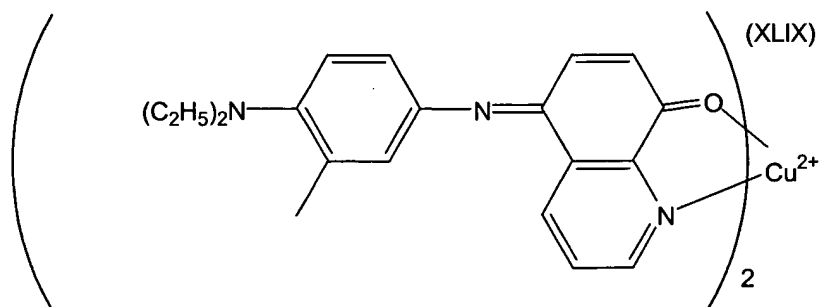
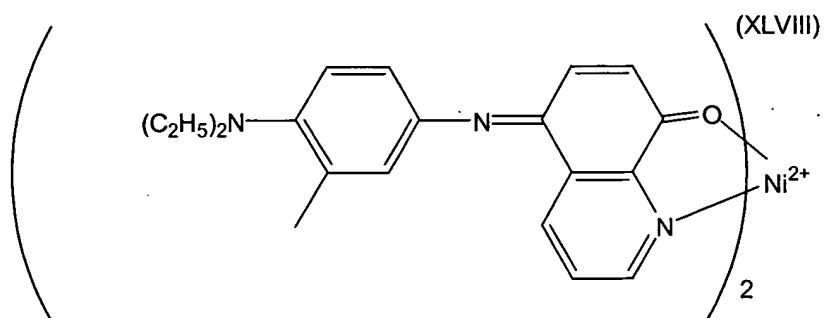
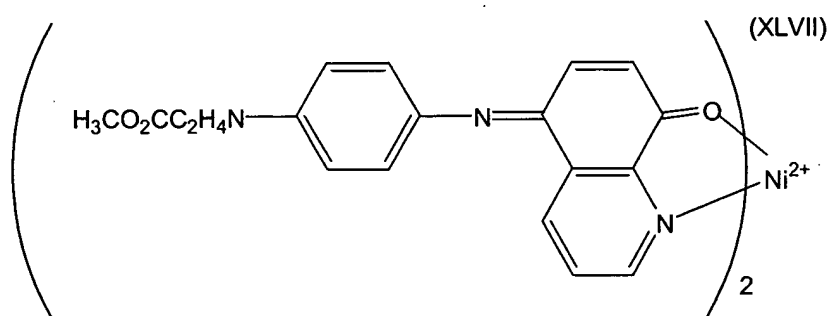


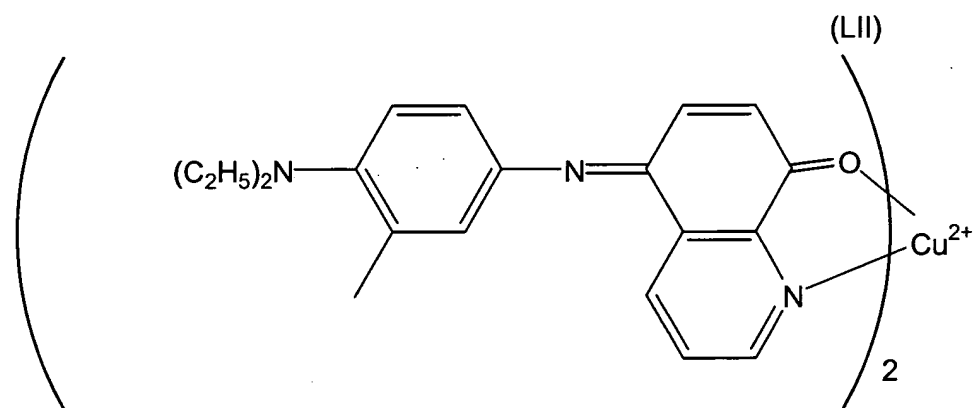
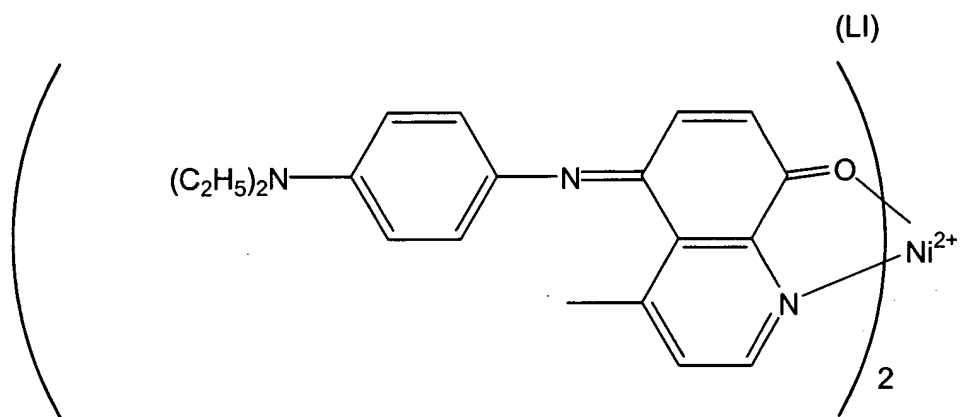
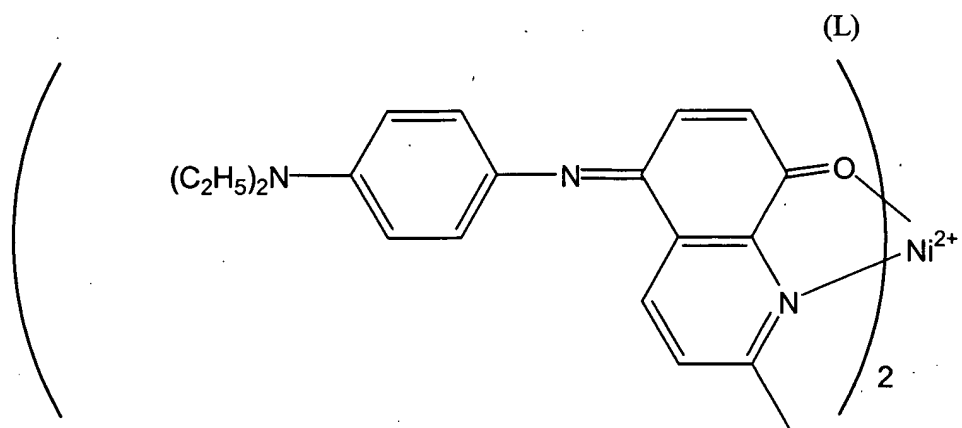






Ac = COCH<sub>3</sub>





Claim 116. (canceled)

Claim 117. (currently amended) The recording medium of claim 101 wherein the heat infrared sensitive dyes are leuco dyes selected from the group consisting of:

- 5 aminotriarylmethanes; aminoxanthenes; aminothioxanthenes; amino-9,10-dihydroacridines; aminophenoxazines; aminophenothiazines; aminodihydrophenazines; aminodiphenylmethanes; leuco indamines; aminohydrocinnamic acids (cyanoethanes, leuco methines) and corresponding esters; hydrozines;
- 10 leuco indigoid dyes; amino-2,3-dihydroanthraquinones; tetrahalo-p,p'-biphenols; 2(p-hydroxyphenyl)-4,5-diphenylimidazoles; phenethylanilines; indanones and combinations thereof.

Claim 118. (previously presented) The recording medium of claim 115 wherein the leuco dyes are selected from the group consisting of aminotriarylmethanes, aminoxanthenes, and leucoindigoid dyes.

Claim 119. (previously presented) The recording medium according to claim 118, the leuco dyes being aminotriarylmethanes wherein two of the aryl groups are phenyl groups having an R1R2N-substituent in the position para to the bond to the methane carbon atom and wherein each of R1 and R2 are independently selected from hydrogen, C1-C10 alkyl, 2-hydroxyethyl, 2-cyanoethyl, and benzyl and wherein the third aryl group is selected from:

- a) phenyl which can be substituted with lower alkyl, lower alkoxy, chloro, diphenylamino, cyano, nitro, hydroxy, fluoro or bromo;
- 25 b) naphthyl which can be substituted with amino, di-lower alkylamino, alkylamino;
- c) pyridyl which can be substituted with alkyl;
- d) quinolyl;
- 30 e) indolinylidene which can be substituted with alkyl.

Claim 120. (previously presented) The recording medium according to claim 119, wherein R1 and R2 are selected from hydrogen and alkyl of 1-4 carbon atoms.

5 Claim 121. (currently amended) The recording medium according to claim 118 wherein the aminotriarylmethanes are selected from tris(N,N-dimethylaminophenyl)methane (LCV); deuterio-tris(N,N-dimethylaminophenyl)methane (D-LCV); tris(N,N-diethylaminophenyl)methane (LECV); deuterio-tris(4-diethylaminophenyl)methane (D-LECV); tris(N,N-di-n-propylaminophenyl)methane (LPCV); tris(N,N-din-butylaminophenyl)methane (LBCV); bis(4-diethylaminophenyl)-(4-diethylamino-2-methylphenyl)methane (LV-1); bis(4-diethylamino-2-methylphenyl)-(4-diethylamino-phenyl)methane (LV-2); tris(4-diethylamino-2-methylphenyl)methane (LV-3); deuterio-bis(4-diethylaminophenyl)-(4-diethylamino-2-methylphenyl)methane (D-LV-1); deuterio-bis(4-diethylamino-2-methylphenyl)(4-diethylaminophenyl)methane (D-LV-2); and bis(4-diethylamino-2-methylphenyl)(3,4-dimethoxyphenyl)methane (LB-8); .

20 Claim 122. (previously presented) The recording medium of claim 121 wherein the aminotriarylmethane leuco dyes have alkyl substituents selected from C1-C4 alkyl, the substituents bonded to the amino moieties.

Claim 123. (previously presented) The recording medium of claim 122  
25 wherein the aminotriaryl methane leuco dyes are further substituted with one or more alkyl groups on the aryl rings, the alkyl groups being independently selected from C1-C3 alkyl.

Claim 124. (previously presented) The recording medium of claim 121  
30 wherein the amino triarylmethane leuco dyes are selected from the group consisting of: D-LECV, LV-1, LV-2, D-LV-1, and D-LV-2.

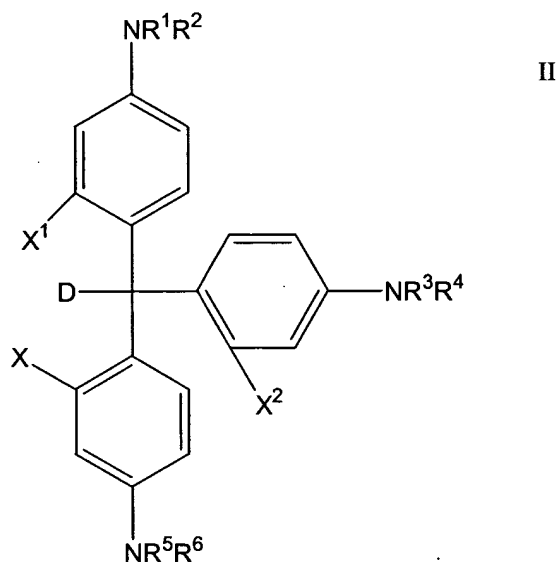
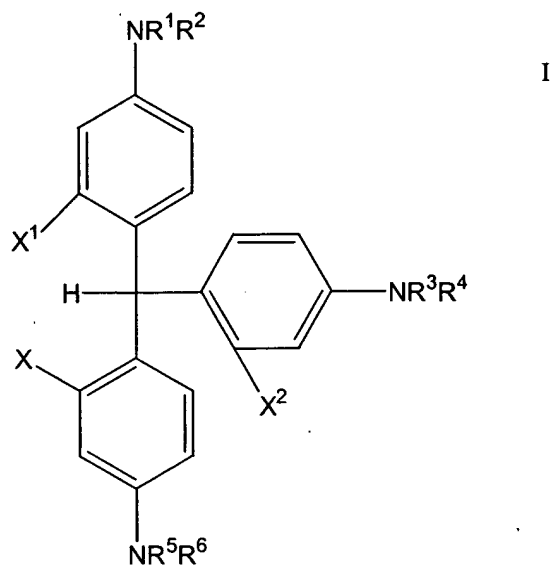
Claim 125. (previously presented) The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is selected from LV-1 and LV-2.

- 5    Claim 126. (previously presented) The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is Trans-3-hydroxy-2-(p-diethylaminobenzyl)indanone (LY-1).

- 10    Claim 127. (previously presented) The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is Benzo((a)-6-N,N-diethylamino-9-(2-methoxycarbonyl)-phenyl)xanthene (LM-5).



Claim 128. (previously presented) The recording medium of claim 124 wherein the aminotriarylmethane leuco dyes comprise at least one of chemi-



cal structures I and II:

- 5 wherein I and II have components X, X<sub>1</sub>, X<sub>2</sub> and R<sub>1</sub> through R<sub>6</sub> selected from a) through g):
- a) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are H.
  - b) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are CH<sub>3</sub>.
  - c) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are C<sub>2</sub>H<sub>5</sub>.

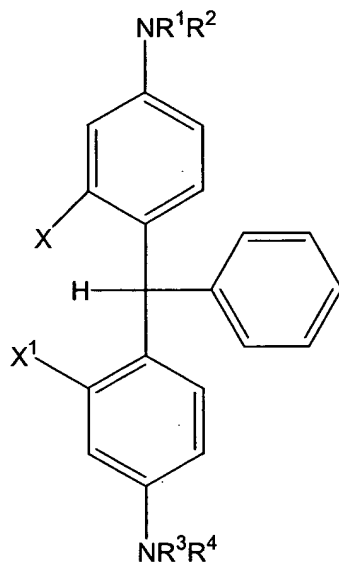
d) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C3-8 alkyl.

e) X and X<sup>1</sup> are H; X<sup>2</sup> is CH<sub>3</sub>; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C1-C8 alkyl.

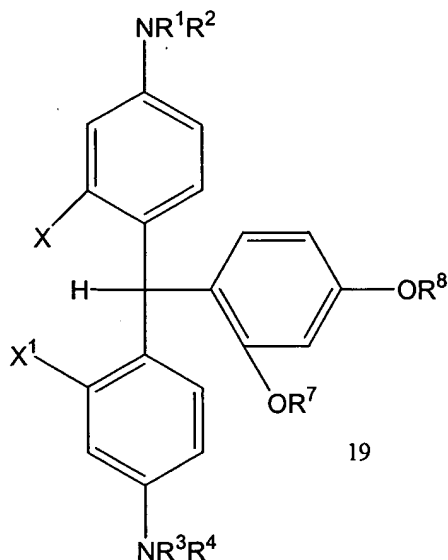
5 f) X is H; X<sup>1</sup> and X<sup>2</sup> are CH<sub>3</sub>; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C1-C8 alkyl.

g) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup>, R<sup>3</sup> and R<sup>5</sup> are independently selected from aryl C6-C10; substituted C6-C10 aryl; and R<sup>2</sup>, R<sup>4</sup>, and R<sup>6</sup> are H.

10 Claim 129. (previously presented) The recording medium of claim 122 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures

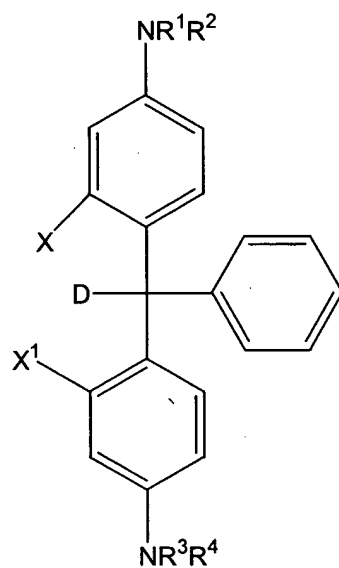


III

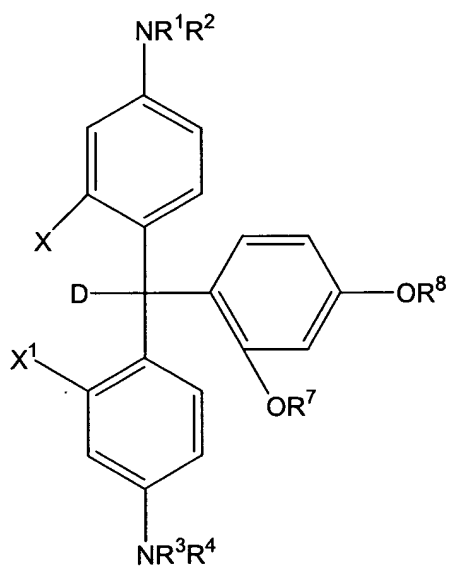


IV

III through VI:



V



VI

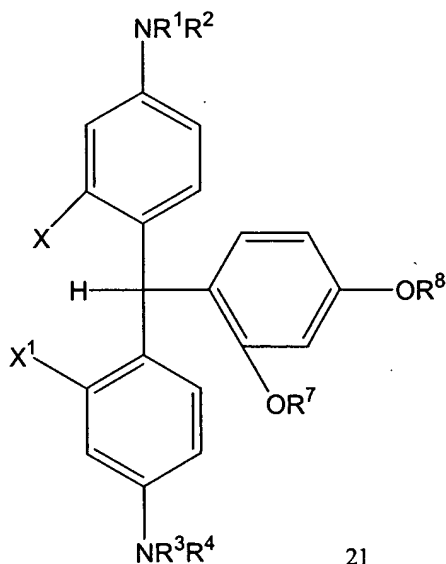
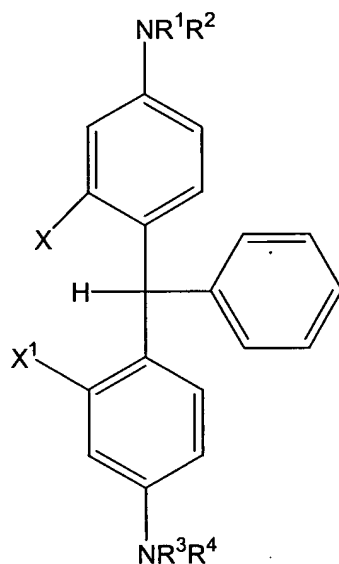
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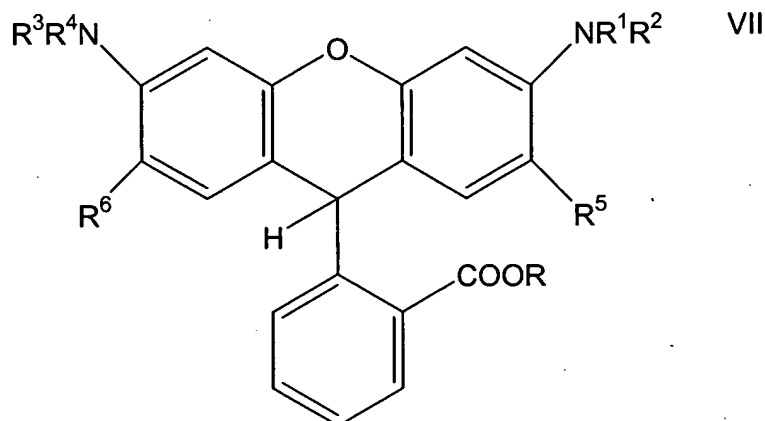
wherein III through VI have components X, X<sup>1</sup>, X<sup>2</sup> and R<sup>1</sup> through R<sup>6</sup> selected from a) through c):

a) X and X<sup>1</sup> are H; and R<sup>1</sup> through R<sup>4</sup> are independently selected from H and C<sub>1</sub>-C<sub>8</sub> alkyl

- b) X and X<sup>1</sup> are H and R<sup>1</sup> and R<sup>3</sup> are aryl; and R<sup>2</sup> and R<sup>4</sup> are H
- c) X = CH<sub>3</sub>, X<sup>1</sup> = H and R<sup>1</sup> through R<sup>4</sup> are independently selected from H and C1-C8 alkyl; and R<sup>7</sup> and R<sup>8</sup> are independently selected from C1-C8 alkyl, or R<sup>7</sup>
- 5 and R<sup>8</sup> are bridged to form a cyclic attachment with a CH<sub>2</sub>- or C<sub>2</sub>H<sub>4</sub>- bond, thereby forming a five- or six-membered ring, respectively.

Claim 130. (previously presented) The recording medium of claim 124 wherein the aminotriarylmethaneleuco dyes comprise chemical structure VII:





wherein R is independently selected from H, C1-C8 alkyl; R<sup>5</sup> and R<sup>6</sup> are independently selected from H and C1-C4 alkyl; R<sup>1</sup> through R<sup>4</sup> are independently selected from H and C1-C6 alkyl, C6-C10 aryl with the proviso that, if R<sup>1</sup> and R<sup>3</sup> are aryl, then R<sup>2</sup> and R<sup>4</sup> are hydrogen.

Claim 131. (previously presented) The recording medium of claim 118 wherein the leuco dyes comprise at least one of aminotriarylmethanes and aminoxanthenes.

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Claim 132. (currently amended) The recording medium of claim ~~103~~ 101 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes ~~comprising~~ comprise at least one of

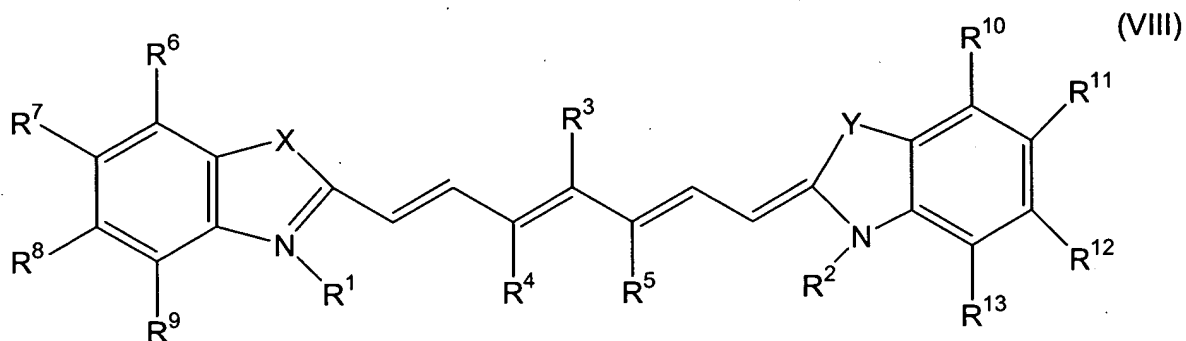
- 1) DF-1: 2-((2-((2-chloro-3-(((1,3-dihydro-1,3,3-trimethyl-2H-indol-2-ylidene)ethylidene)-1-cyclopenten-1-yl)ethenyl)-1,3,3-trimethyl-3H-indolium trifluoromethanesulfonate;
- 2) RD-1: Cyasorb® IR-165 Near IR Dye(absorption maximum at 1070 nm); and
- 3) SQS 4((((3-(((2,6-bis(1,10-dimethylethyl)-4H-thiopyrann-4-ylidene)methyl)-2-methyl)2-hydroxy-4-oxo-2-cyclobuten-1-ylidene)methyl)-2,6-bis(1,1-dimethylethyl)thiopyrilium hydroxide, inner salt,

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Claim 133. (currently amended) The recording medium of claim 132 wherein the ~~heat sensitive dyes are~~ near IR absorbing dyes ~~comprising~~ comprise at least one of DF-1 and RD-1.

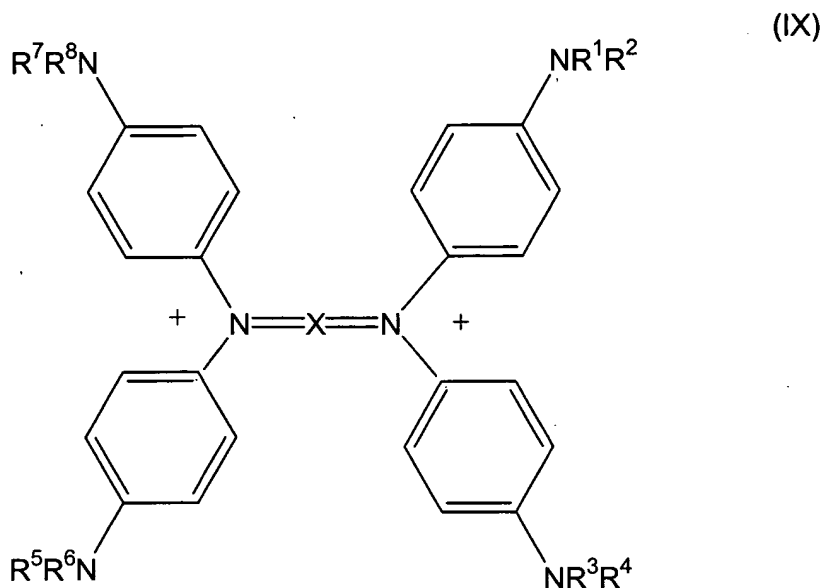
- 5 Claim 134. (currently amended) The recording medium of claim 133 wherein the ~~heat sensitive dyes are~~ near IR absorbing dyes ~~comprising~~ comprise DF-1.

- 10 Claim 135. (currently amended) The recording medium of claim 101 wherein the ~~heat sensitive~~ near IR absorbing dyes comprise Heptamethine cyanine dyes having a chemical structure (VIII) as shown below:



- 15 where R3 can be H, halogen, alkyl, aryl, alkoxy, aryloxy, thioalkyl, or thioaryl; R4 and R5 are independently selected from H, alkyl, aryl, or are bridged to form a cyclic attachment; each of R6 through R13 is independently selected from H, alkyl, aryl, or any two adjacent R6 through R9 and any two adjacent R10 through R13 can form R10 through R13 can form a fused aryl;
- 20 each of R1 and R2 are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R'' where R', R'' are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each
- 25 represented by the formula CR'R'' where R', R'' are independently selected from H, C1-C6 alkyl, O, S, Se and Te.

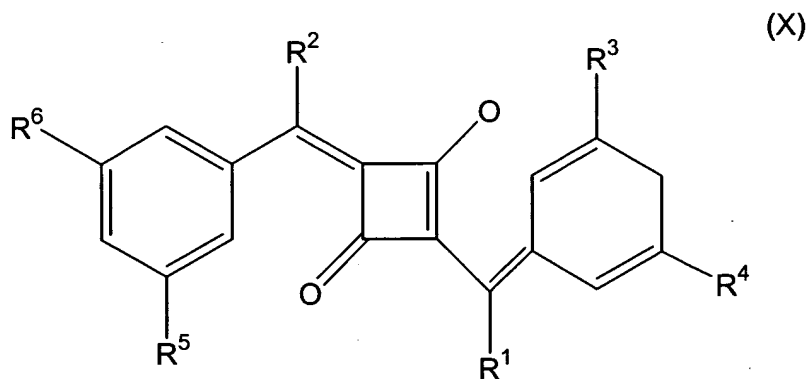
Claim 136. (currently amended) The recording medium of claim 101 wherein the ~~heat sensitive~~ near IR absorbing dyes comprise Benzenaminium dyes having structure (IX) as shown below:

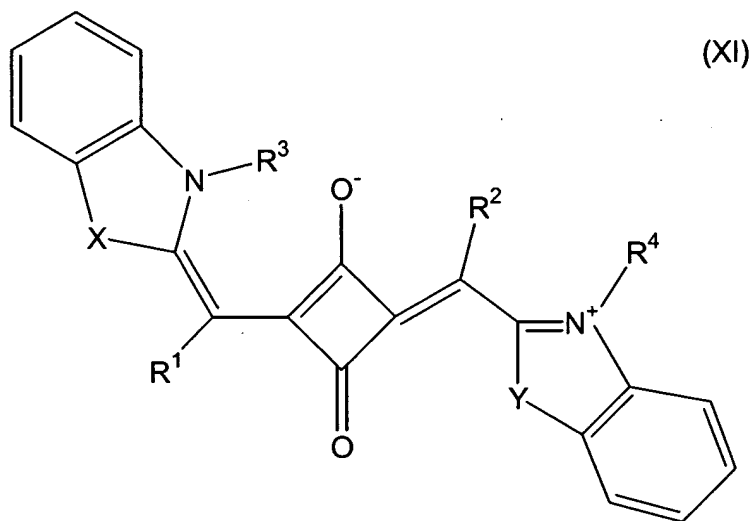


5

wherein each of  $\text{R}^1$  through  $\text{R}^8$  is independently selected from C1-C6 alkyl; X is a substituted 1,4-cyclohexadiene.

Claim 137. (currently amended) The recording medium of claim 101 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes having have structure (X) or structure (XI) as shown below:





5

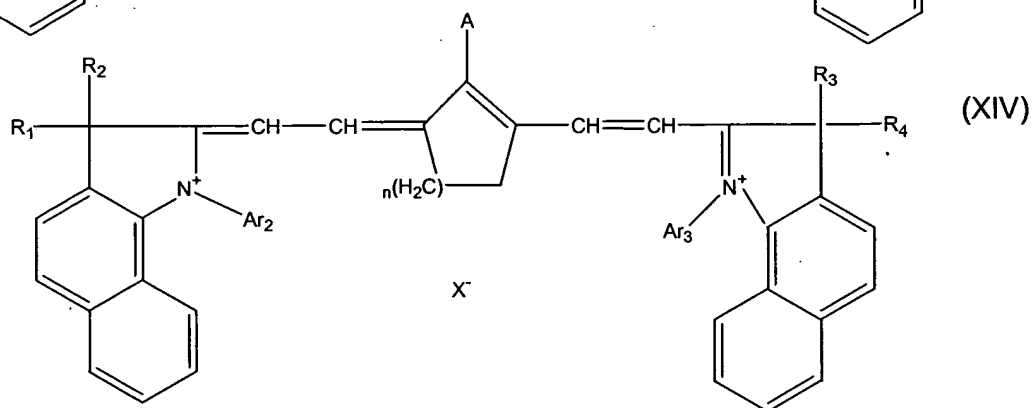
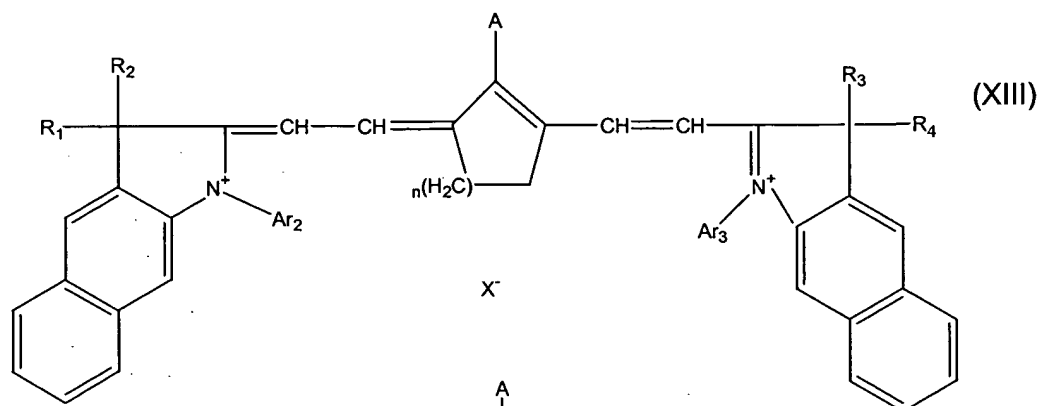
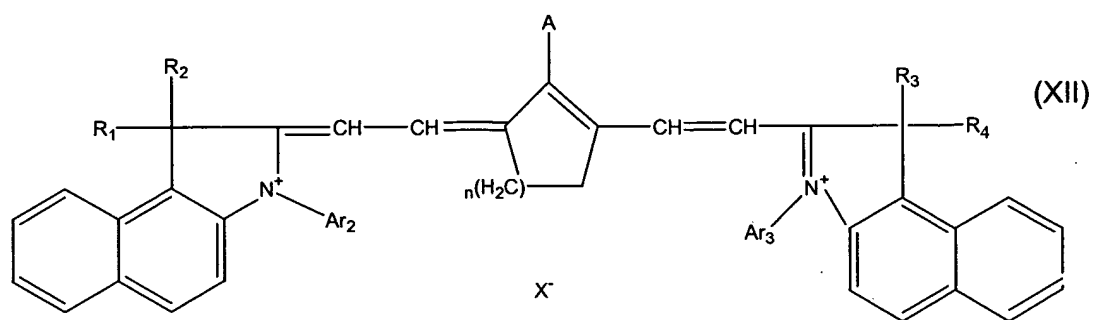
wherein each of R<sub>1</sub> through R<sub>6</sub> is independently selected from H, C<sub>1</sub>-C<sub>6</sub> alkyl; X and Y are independently selected from O, S, Se, Te, N-R<sub>7</sub>, wherein R<sub>7</sub> is selected from C<sub>1</sub>-C<sub>6</sub> alkyl and

- 10 wherein each of R<sub>1</sub> and R<sub>2</sub> is independently selected from H, C<sub>1</sub>-C<sub>6</sub> alkyl; each of X and Y is independently selected from O, S, Se, Te, N—R<sub>7</sub>, wherein R<sub>7</sub> is selected from C<sub>1</sub>-C<sub>6</sub> alkyl; each R<sub>3</sub> and R<sub>4</sub> is independently selected from alkyl, aryl or substituted alkyl and wherein the benzene rings in structure (XI) may be further substituted.

15

Claim 138. (currently amended) The recording medium of claim 101 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes are selected from the group consisting of:





wherein R1-R4 are independently substituted or unsubstituted C1-C6 alkyl; A is substituted or unsubstituted phenyl, naphthyl, C1-C6 alkyl, or C7-C10 aralkyl; Ar2 and Ar3 are independently substituted or unsubstituted phenyl or naphthyl; X is a monovalent anion; and n is 1 or 2.

Claim 139. (previously presented) The recording medium of claim 138 wherein the alkyl, aryl or aralkyl substitution groups comprise at least one of: hydroxy, alkoxy, chloro, bromo, cyano, and amino.

Claim 140. (currently amended) The recording medium of claim 101 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes are selected from the group consisting of: 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-1); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-2); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-3); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-4); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-5); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-6).

20

Claim 141. (previously presented) The recording medium of claim 140 wherein the near IR-absorbing dyes comprise at least one of JC-1 and JC-2.

Claim 142. (previously presented) The recording medium of claim 140 wherein the near IR-absorbing dyes comprise JC-1.

25

Claim 143. (currently amended) The recording medium of claim 101 wherein the light infrared sensitive and ~~temperature sensitive~~ near-IR absorbing dyes are encapsulated in microcapsules, the microcapsules comprising polymers having  $T_g$  from 80°C to 200°C.

30

Claim 144. (previously presented) The recording medium of claim 143 wherein the polymers are selected from the group consisting of polyurethanes, acrylates, styrenes and combinations thereof.

- 5    Claim 145. (previously presented) The recording medium of claim 143 wherein the polymers comprise styrene-butylacrylate-polyethylene glycol acrylate.

Claim 146. (currently amended) A method of making a CD/DVD recording  
10    medium comprising the step of applying on at least one surface of the recording medium laser sensitive materials ~~selected from at least one of the group consisting of~~ comprising infrared sensitive dyes and ~~heat sensitive~~ near IR absorbing dyes;  
wherein the at least one surface comprises at least one image recording area  
15    having at least one labeling surface, the at least one labeling surface comprising laser sensitive materials;  
and wherein the laser sensitive materials are for labeling the at least one surface of the recording medium and not for primary data storage.

- 20    Claim 147. (canceled)

Claim 148. (canceled)

- Claim 149. (previously presented) The method of claim 146 wherein the infrared sensitive dyes comprise 3'phenyl-7-diethylamino-2,2'-spirodi-(2H-1-benzopyran); IR 10000 FBK; IR 10000 FBE; IR 10000 GBK; and IR 10000 GBE.  
25

- Claim 150. (previously presented) The method of claim 146 wherein the infrared sensitive dyes comprise colorless electron donating type dry precursor  
30    compounds which react with a developer compound to generate a dye.

Claim 151. (previously presented) The method of claim 150 wherein the colorless electron donating type dry precursor compound has at least one of a lactone, a lactam, a sulfone, a spiropyran, an ester or an amido structure.

5 Claim 152. (previously presented) The method of claim 150 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of triarylmethane compounds, bisphenylmethane compounds, xanthene compounds, xanthene compounds, thiazine compounds, spiropyran compounds and the like.

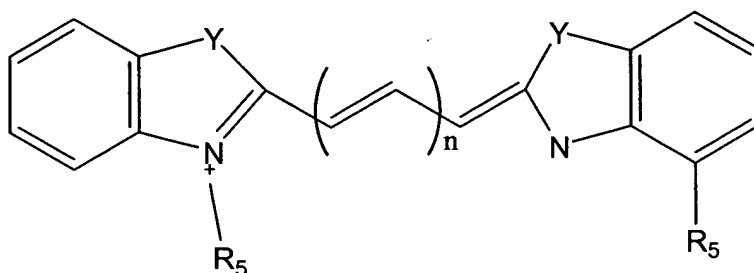
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Claim 153. (previously presented) The method of claim 152 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of Crystal Violet lactone, benzoyl leuco methylene blue, Malachite Green Lactone, p-nitrobenzoyl leuco methylene blue, 3-dialkylamino-7-dialkylamino-fluoran, 3-methyl-2,2'-spirobi(benzo-f-chrome), 3,3-bis(p-dimethylaminophenyl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-methylindole-3-yl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-phenylindole-3-yl)phthalide, 3,3-bis(1,2-dimethylindole-3-yl)-5-dimethylaminophthalide, 3,3-bis-(1,2-dimethylindole-3-yl)-6-dimethylaminophthalide, 3,3-bis-(9-ethylcarbazole-3-yl)-5-dimethylaminophthalide, 3,3-bis(2-phenylindole-3-yl)-5-dimethylaminophthalide, 3-p-dimethylaminophenyl-3-(1-methyl pyrrole-2-yl)-6-dimethylaminophthalide, 4,4'-bis-dimethylaminobenzhydrin benzyl ether, N-halophenyl leuco Auramine, N-2,4,5-trichlorophenyl leuco Auramine, Rhodamine-B-anilinolactam, Rhodamine-(p-nitroanilino)lactam, Rhodamine-B-(p-chloroanilino)lactam, 3-dimethylamino-y-methoxyfluoran, 3-diethylamino-7-methoxyfluoran, 3-diethylamino-7-(acetylmethylamino)fluoran, 3-diethylamino-7-(dibenzylamino)fluoran, 3-diethylamino-7-(methylbenzylamino)fluoran, 3-diethylamino-7-(chloroethylmethylamino)fluoran, 3-diethylamino-7-(diethylamino)fluoran, 3-methyl-spiro-dinaphthopyran, 3,3'-dichloro-spiro-dinaphthopyran, 3-benzyl-spiro-dinaphthopyran, 3-methyl-naphtho-(3-methoxybenzo)-spiropyran, 3-propyl-spirodibenzoidipyran, and combinations thereof.

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Claim 154. (previously presented) The method of claim 146 wherein the infrared sensitive dyes cyanine dyes represented by the following formula (XX);

(XX)



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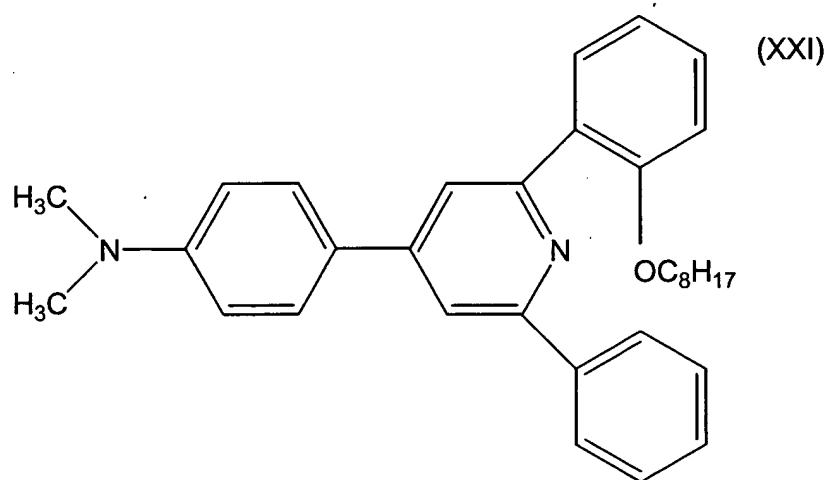
wherein n is 0, 1, 2 or 3; R<sub>5</sub> represents an alkyl group; and Y represents CH=CH, N-CH<sub>3</sub>, C(CH<sub>3</sub>)<sub>2</sub>, O, S or Se.

Claim 155. (previously presented) The method of claim 146 wherein the infrared sensitive dyes comprise a compound having at least one of a lactone, lactam, sulfone, spiropyran, ester, and amide structure.

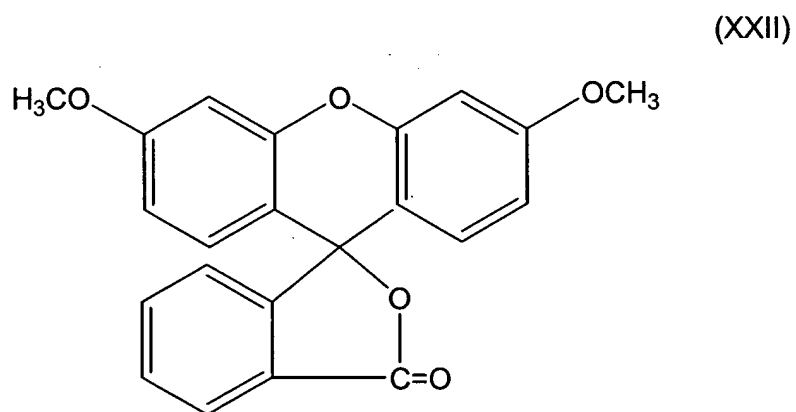
Claim 156. (previously presented) The method of claim 155 wherein the infrared sensitive dyes are selected from the group consisting of triarylmethane compounds, bisphenyl methane compounds, xanthene compounds, fluoran compounds, thiazine compounds and spiropyran compounds.

15

Claim 157. (previously presented) The method of claim 146 wherein the infrared sensitive dyes are yellow dyes selected from the group consisting of.

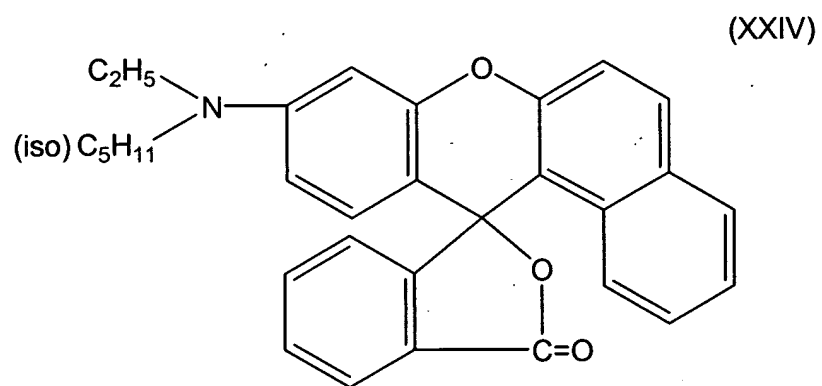
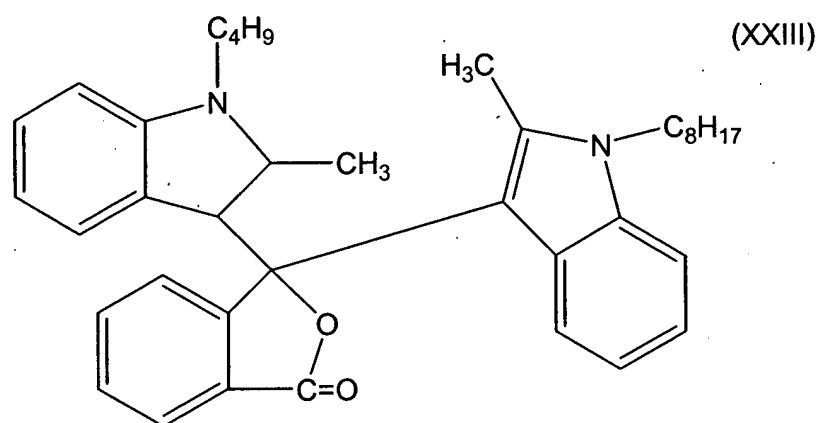


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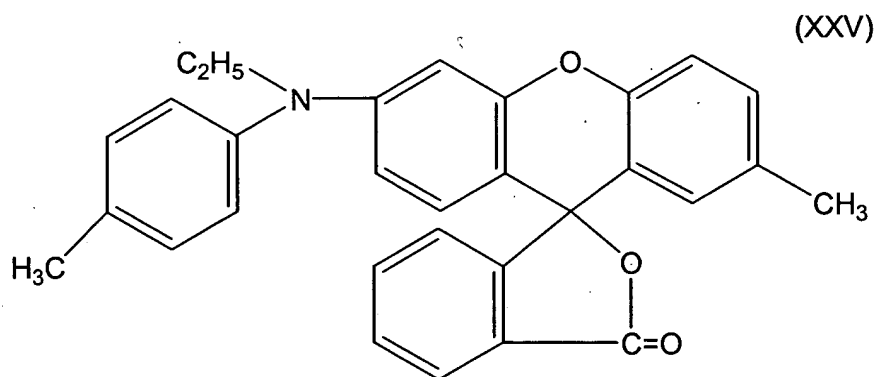


Claim 158. (previously presented) The method of claim 146 wherein the infrared sensitive dyes are Magenta dyes selected from the group consisting of

10

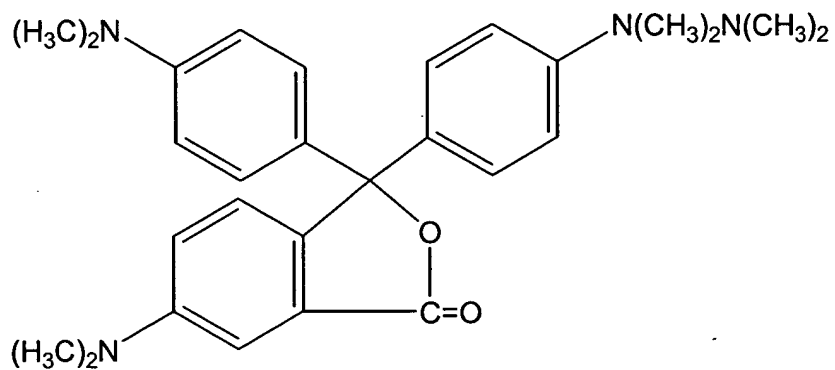


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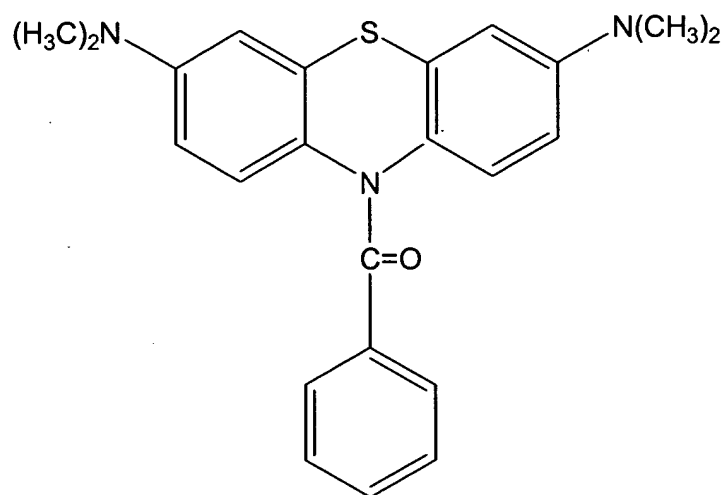


Claim 159. (previously presented) The method of claim 146 wherein the infra-red sensitive dyes are cyan dyes selected from the group consisting of

(XXVI)

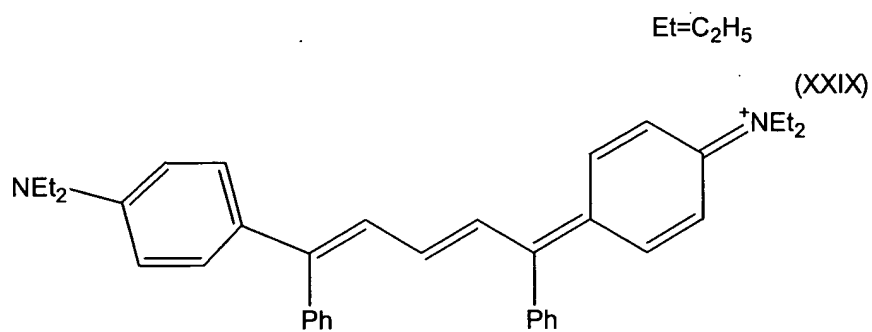
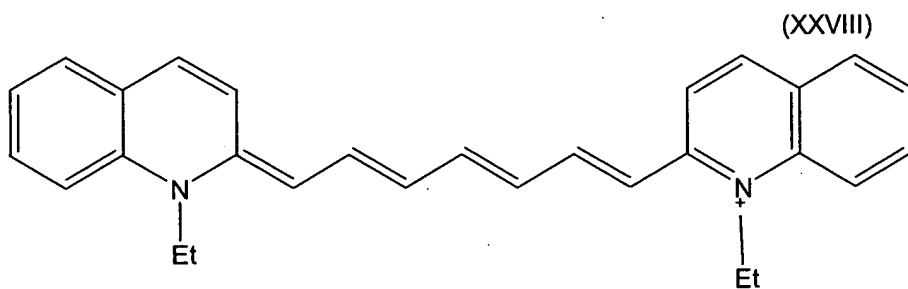


(XXVII)

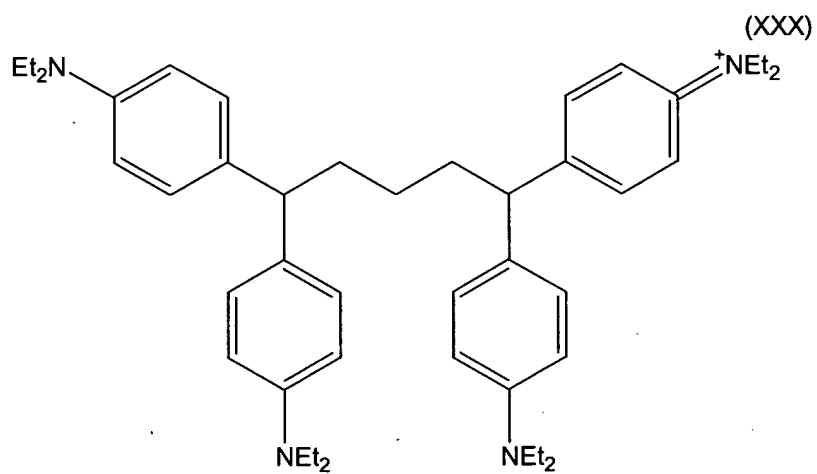


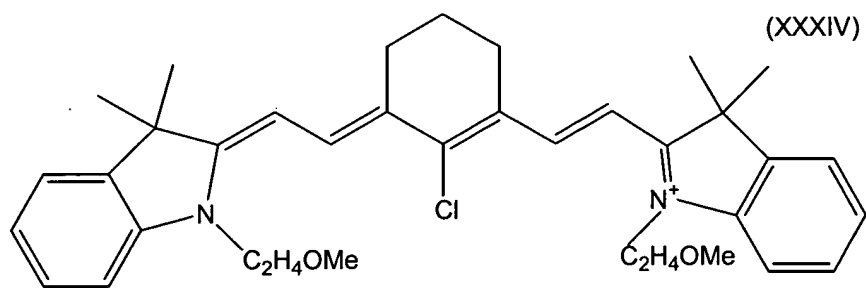
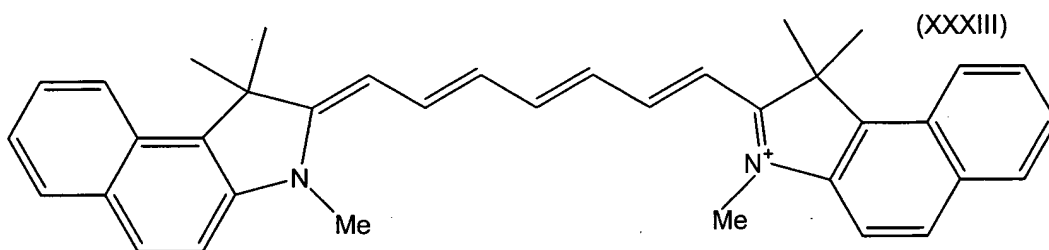
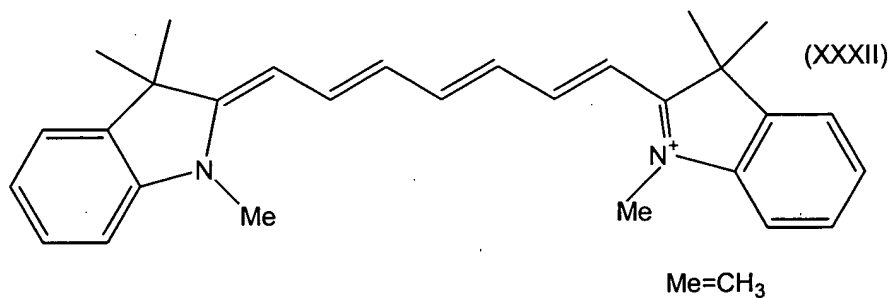
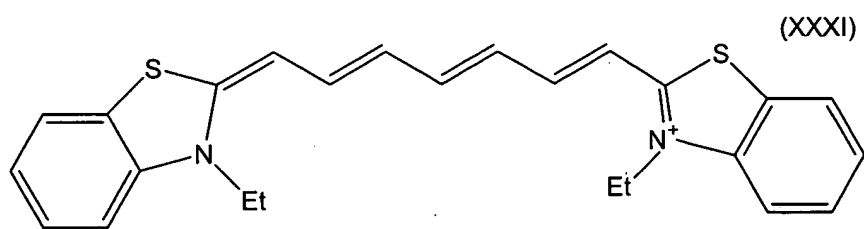


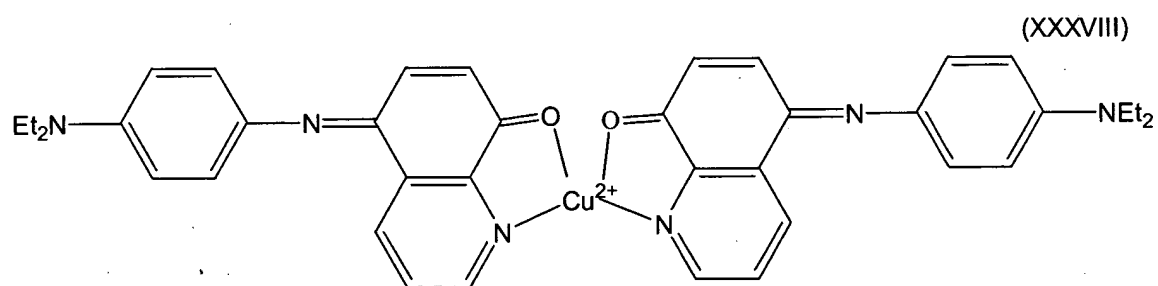
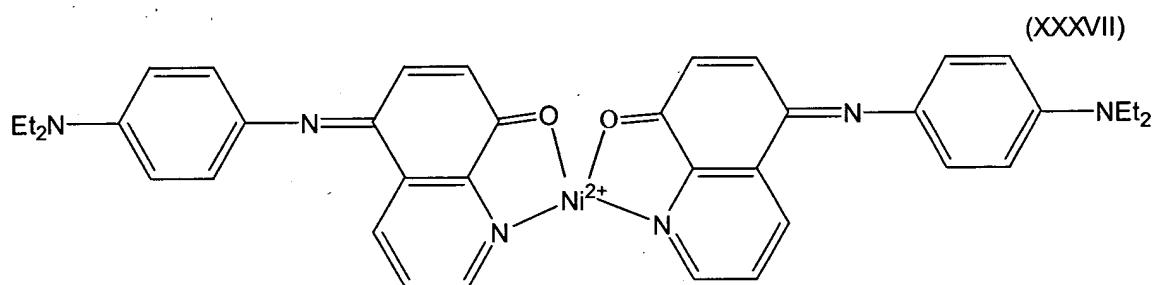
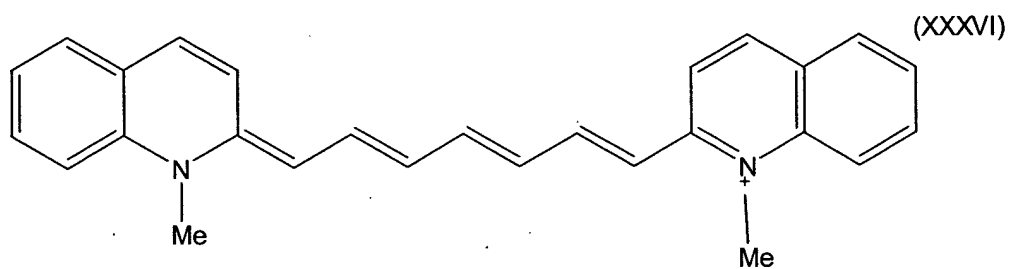
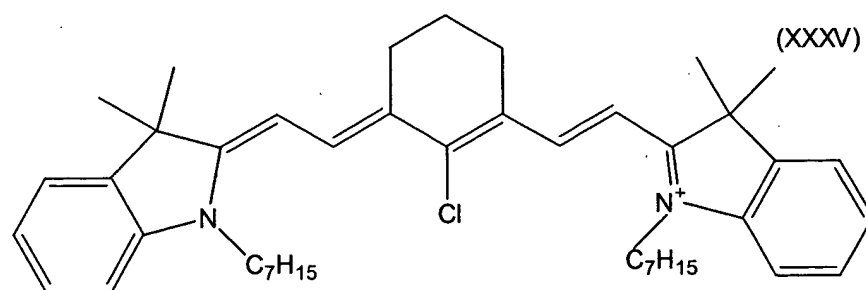
Claim 160. (previously presented) The method of claim 146 wherein the infra-red sensitive dyes are selected from the group consisting of

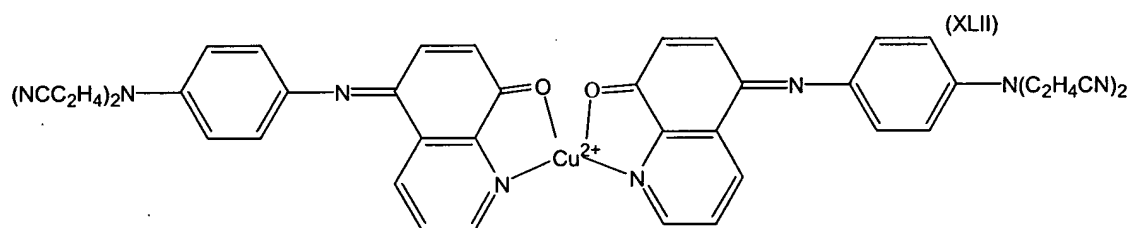
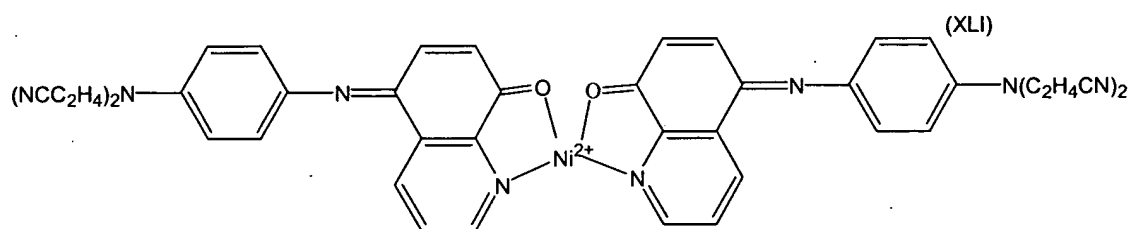
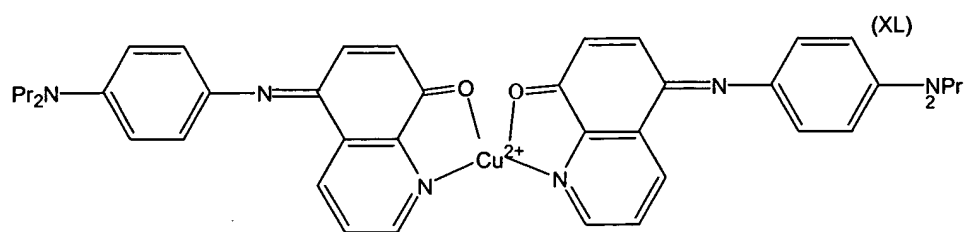
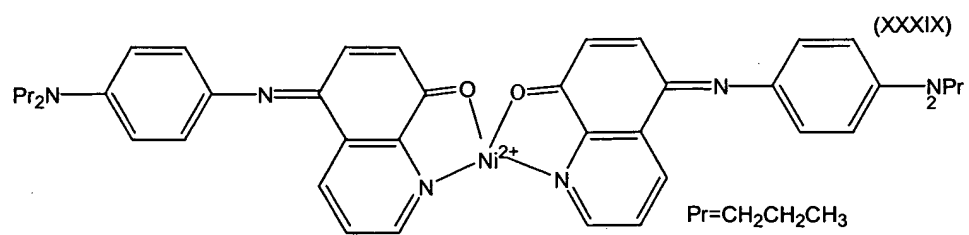


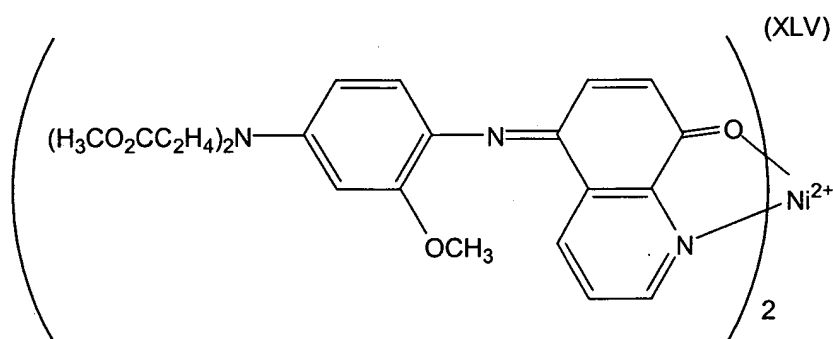
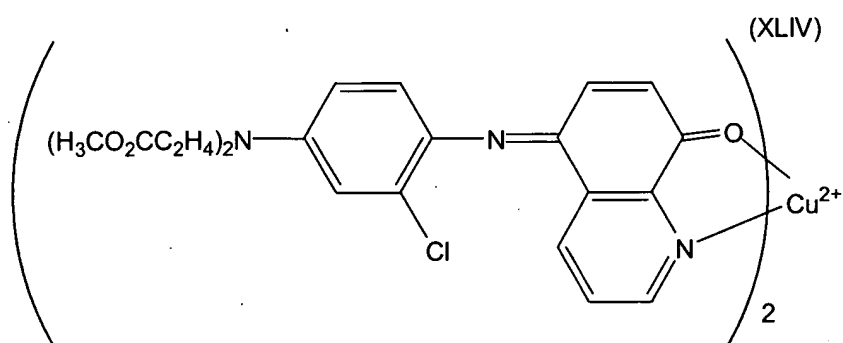
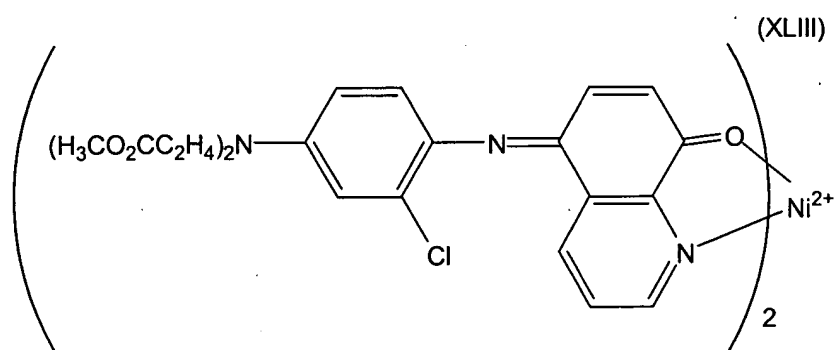
Ph=phenyl

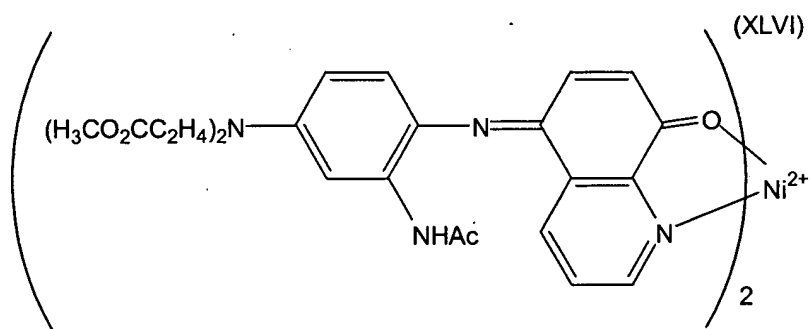




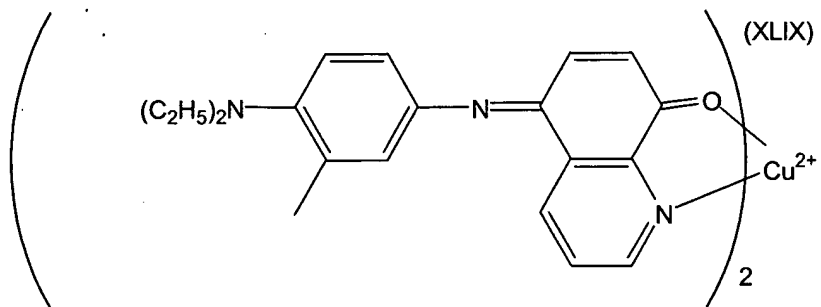
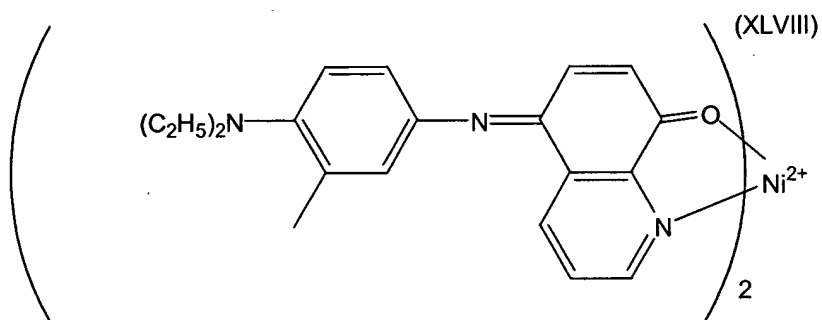
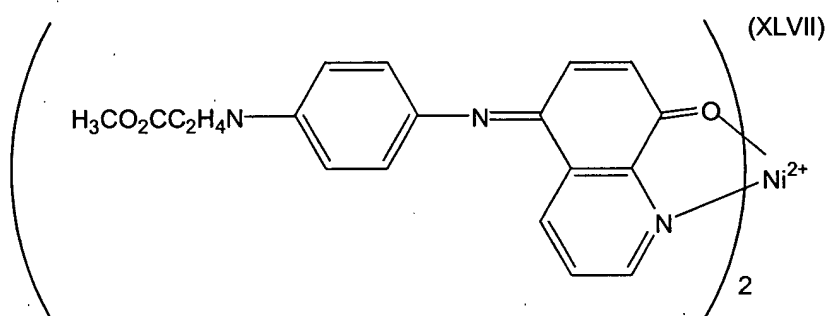


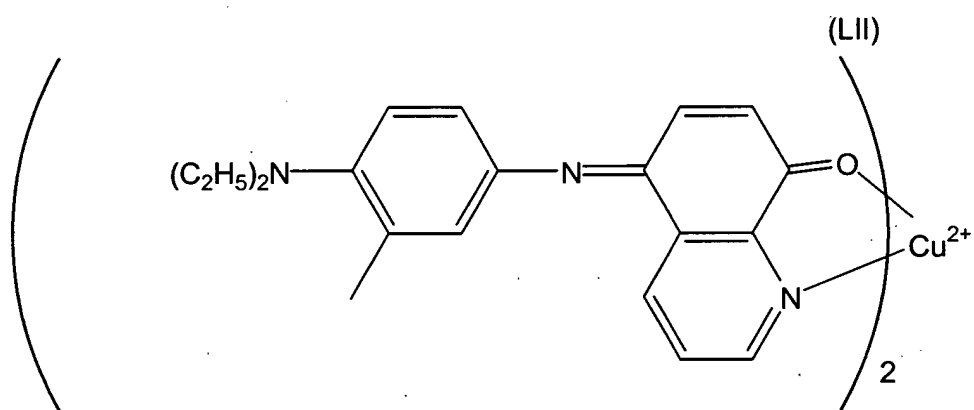
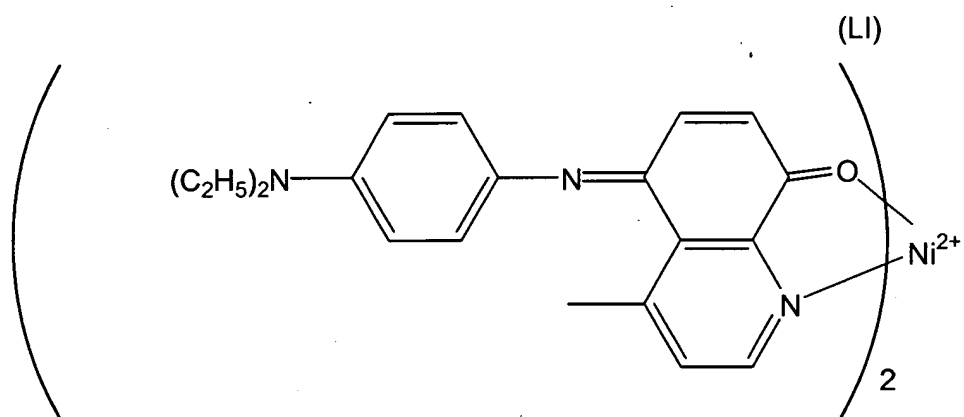
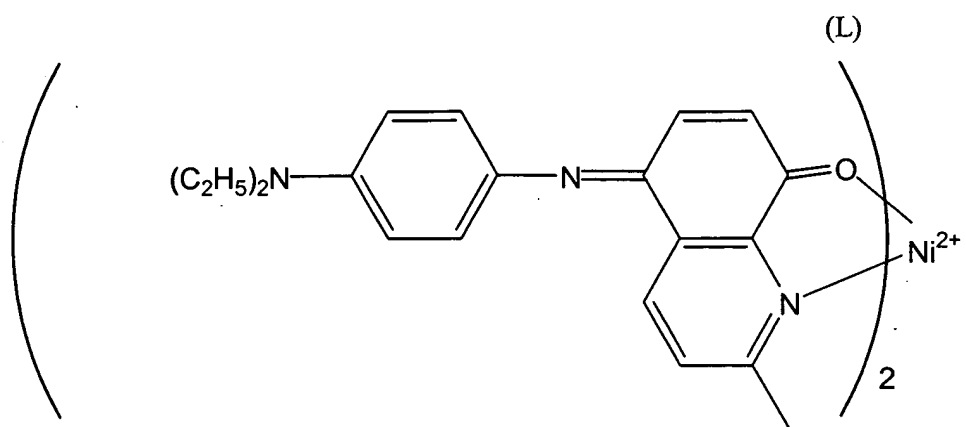






Ac = COCH<sub>3</sub>





Claim 161. (canceled)

Claim 162. (currently amended) The method of claim 146 wherein the ~~heat~~  
infrared sensitive dyes are leuco dyes selected from the group consisting of:  
 5 aminotriarylmethanes; aminoxanthenes; aminothioxanthenes; amino-9,10-  
 dihydroacridines; aminophenoxazines; aminophenothiazines; aminodihydro-  
 phenazines; aminodiphenylmethanes; leuco indamines; aminohydrocinnamic  
 acids (cyanoethanes, leuco methines) and corresponding esters; hydrozines;  
 10 leuco indigoid dyes; amino-2,3-dihydroanthraquinones; tetrahalo-p,p'-  
 biphenols; 2(p-hydroxyphenyl)-4,5-diphenylimidazoles; phenethylanilines; in-  
 danones and combinations thereof.

Claim 163. (previously presented) The method of claim 161 wherein the leuco  
 dyes are selected from the group consisting of aminotriarylmethanes, ami-  
 15 noxanthenes, and leucoindigoid dyes.

Claim 164. (previously presented) The method according to claim 163, the  
 leuco dyes being aminotriarylmethanes wherein two of the aryl groups are  
 phenyl groups having an R<sub>1</sub>R<sub>2</sub>N-substituent in the position para to the bond  
 20 to the methane carbon atom and wherein each of R<sub>1</sub> and R<sub>2</sub> are independ-  
 ently selected from hydrogen, C<sub>1</sub>-C<sub>10</sub> alkyl, 2-hydroxyethyl, 2-cyanoethyl,  
 and benzyl and wherein the third aryl group is selected from:

- a) phenyl which can be substituted with lower alkyl, lower alkoxy,  
 chloro, diphenylamino, cyano, nitro, hydroxy, fluoro or bromo;
- 25 b) naphthyl which can be substituted with amino, di-lower al-  
 kylamino, alkylamino;
- c) pyridyl which can be substituted with alkyl;
- d) quinolyl;
- e) indolinylidene which can be substituted with alkyl.

30

Claim 165. (previously presented) The method according to claim 164,  
 wherein R<sub>1</sub> and R<sub>2</sub> are selected from hydrogen and alkyl of 1-4 carbon at-  
 oms.



Claim 166. (currently amended) The method according to claim 163 wherein the aminotriarylmethanes are selected from tris(N,N-dimethylaminophenyl)methane (LCV); deuterio-tris(N,N-dimethylaminophenyl)methane (D-LCV); tris(N,N-diethylaminophenyl)methane (LECV); deuterio-tris(4-diethylaminophenyl)methane (D-LECV); tris(N,N-di-n-propylaminophenyl)methane (LPCV); tris(N,N-din-butylaminophenyl)methane (LBCV); bis(4-diethylaminophenyl)-(4-diethylamino-2-methyl-phenyl)methane (LV-1); bis(4-diethylamino-2-methylphenyl)-(4-diethylamino-phenyl)methane (LV-2); tris(4-diethylamino-2-methylphenyl)methane (LV-3); deuterio-bis(4-diethylaminophenyl)-(4-diethylamino-2-methylphenyl)methane (D-LV-1); deuterio-bis(4-diethylamino-2-methylphenyl)(4-diethylaminophenyl)methane (D-LV-2); and bis(4-diethylamino-2-methylphenyl)(3,4-dimethoxyphenyl)methane (LB-8);

Claim 167. (previously presented) The method of claim 166 wherein the aminotriarylmethane leuco dyes have alkyl substituents selected from C1-C4 alkyl, the substituents bonded to the amino moieties.

Claim 168. (previously presented) The method of claim 167 wherein the aminotriaryl methane leuco dyes are further substituted with one or more alkyl groups on the aryl rings, the alkyl groups being independently selected from C1-C3 alkyl.

Claim 169. (previously presented) The method of claim 166 wherein the amino triarylmethane leuco dyes are selected from the group consisting of: D-LECV, LV-1, LV-2, D-LV-1, and D-LV-2.

Claim 170. (previously presented) The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is selected from LV-1 and LV-2.

Claim 171. (previously presented) The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is Trans-3-hydroxy-2-(p-diethylaminobenzyl)indanone (LY-1).

- 5 Claim 172. (previously presented) The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is Benzo((a)-6-N,N-diethylamino-9-(2-methoxycarbonyl)-phenyl)xanthene (LM-5).

Claim 173. (previously presented) The method of claim 169 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures I and II:

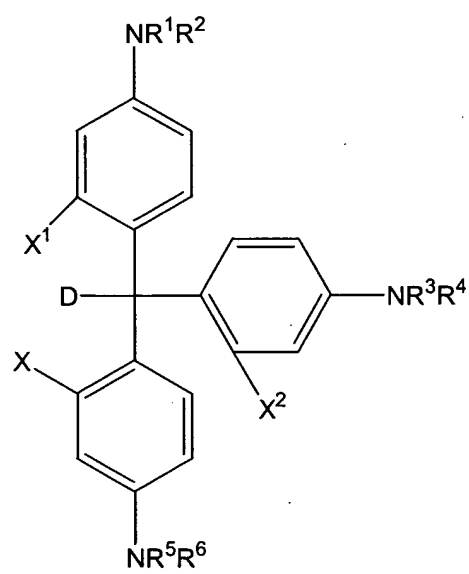
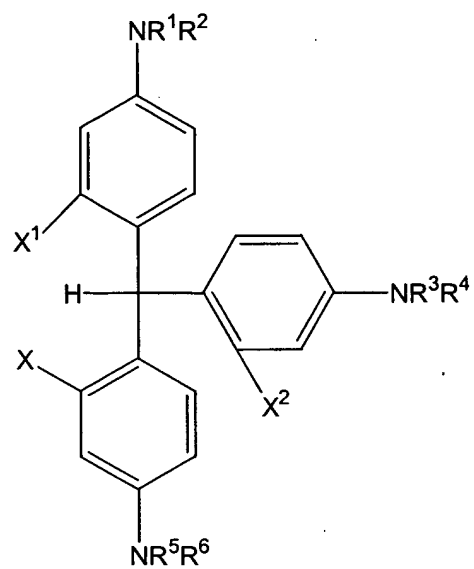
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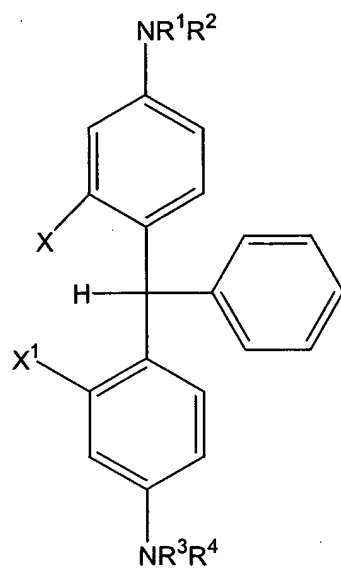
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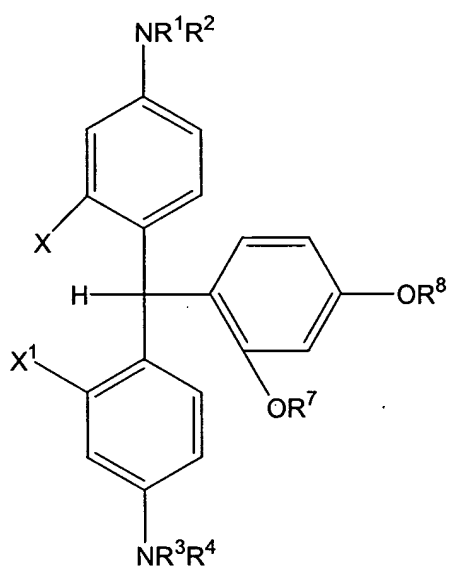


wherein I and II have components X, X<sub>1</sub>, X<sub>2</sub> and R<sub>1</sub> through R<sub>6</sub> selected from a) through g):

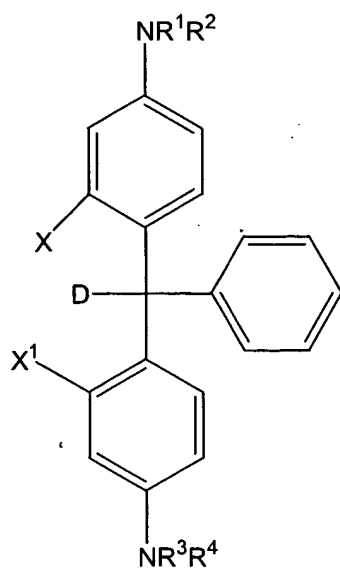
- a) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are H.
  - b) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are CH<sub>3</sub>.
  - 5 c) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are C<sub>2</sub>H<sub>5</sub>.
  - d) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C3-8 alkyl.
  - e) X and X<sup>1</sup> are H; X<sup>2</sup> is CH<sub>3</sub>; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C1-C8 alkyl.
  - 10 f) X is H; X<sup>1</sup> and X<sup>2</sup> are CH<sub>3</sub>; R<sup>1</sup> through R<sup>6</sup> are independently selected from H and C1-C8 alkyl.
  - g) X, X<sup>1</sup> and X<sup>2</sup> are H; R<sup>1</sup>, R<sup>3</sup> and R<sup>5</sup> are independently selected from aryl C6-C10; substituted C6-C10 aryl; and R<sup>2</sup>, R<sup>4</sup>, and R<sup>6</sup> are H.
- 15 Claim 174. (previously presented) The method of claim 167 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures III through VI:



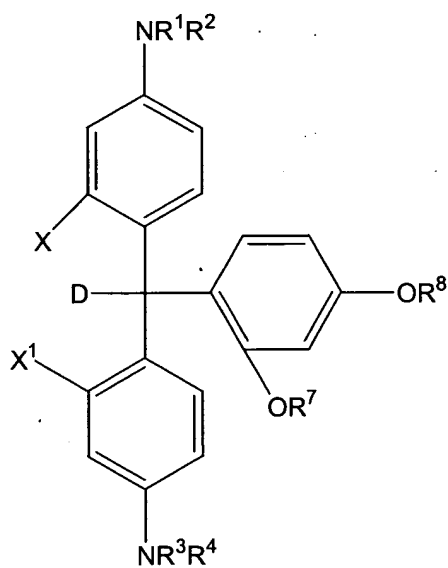
III



IV



V



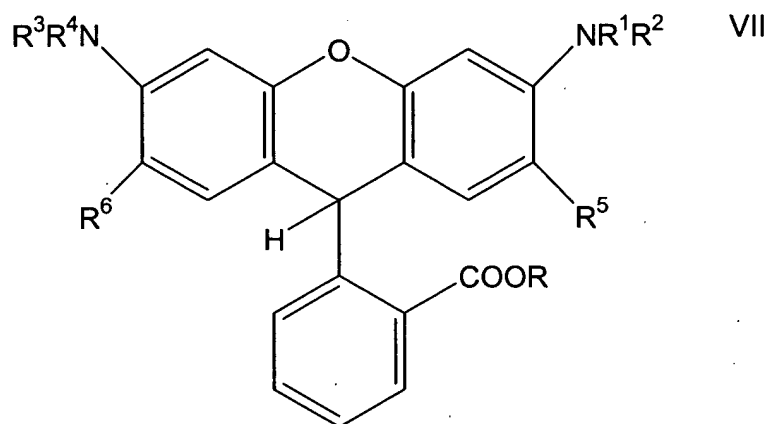
VI

wherein III through VI have components  $\text{X}$ ,  $\text{X}^1$ ,  $\text{X}^2$  and  $\text{R}^1$  through  $\text{R}^6$  selected from a) through c):

- 5        a)     $\text{X}$  and  $\text{X}^1$  are  $\text{H}$ ; and  $\text{R}^1$  through  $\text{R}^4$  are independently selected from  $\text{H}$  and  $\text{C}1\text{-C}8$  alkyl
- b)     $\text{X}$  and  $\text{X}^1$  are  $\text{H}$  and  $\text{R}^1$  and  $\text{R}^3$  are aryl; and  $\text{R}^2$  and  $\text{R}^4$  are  $\text{H}$
- c)     $\text{X} = \text{CH}_3$ ,  $\text{X}^1 = \text{H}$  and  $\text{R}^1$  through  $\text{R}^4$  are independently selected from  $\text{H}$  and  $\text{C}1\text{-C}8$  alkyl; and  $\text{R}^7$  and  $\text{R}^8$  are independently selected from  $\text{C}1\text{-C}8$  alkyl, or  $\text{R}^7$
- 10

and R<sup>8</sup> are bridged to form a cyclic attachment with a CH<sub>2</sub>- or C<sub>2</sub>H<sub>4</sub>- bond, thereby forming a five- or six-membered ring, respectively.

Claim 175. (previously presented) The method of claim 169 wherein the aminotriarylmethaneleuco dyes comprise chemical structure VII:



wherein R is independently selected from H, C1-C8 alkyl; R<sup>5</sup> and R<sup>6</sup> are independently selected from H and C1-C4 alkyl; R<sup>1</sup> through R<sup>4</sup> are independently selected from H and C1-C6 alkyl, C6-C10 aryl with the proviso that, if R<sup>1</sup> and R<sup>3</sup> are aryl, then R<sup>2</sup> and R<sup>4</sup> are hydrogen.

Claim 176 (previously presented) The method of claim 163 wherein the leuco dyes comprise at least one of aminotriarylmethanes and aminoxanthenes.

Claim 177. (currently amended) The method of claim 448 146 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes ~~comprising~~ comprise at least one of

1) DF-1: 2-((2-((2-chloro-3-(((1,3-dihydro-1,3,3-trimethyl-2H-indol-2-ylidene)ethylidene)-1-cyclopenten-1-yl)ethenyl)-1,3,3-trimethyl-3H-indolium trifluoromethanesulfonate;

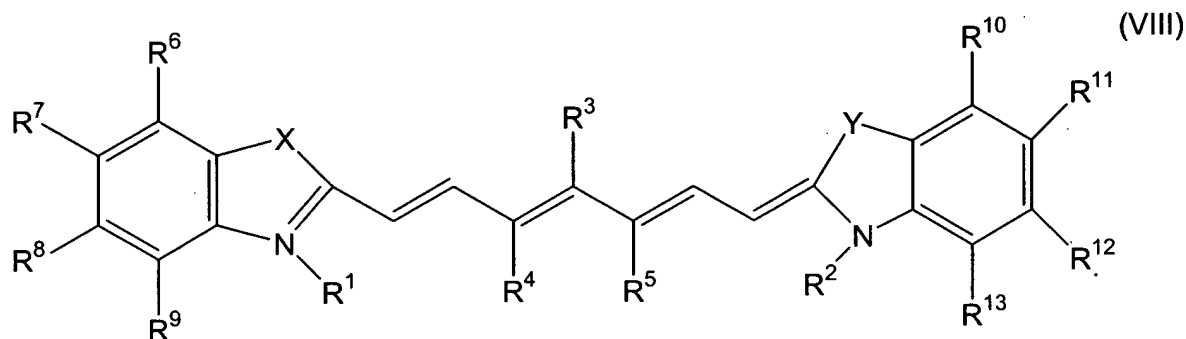
2) RD-1: Cyasorb® IR-165 Near IR Dye(absorption maximum at 1070 nm);  
and

3) SQS 4((((3-((((2,6-bis(1,10-dimethylethyl)-4H-thiopyrann-4-ylidene)methyl)-2-methyl)2-hydroxy-4-oxo-2-cyclobuten-1-ylidene)methyl-2,6-bis(1,1-dimethylethyl)thiopyrillium hydroxide, inner salt,

- 5 Claim 178. (currently amended) The method of claim 177 wherein the ~~heat sensitive dyes are~~ near IR absorbing dyes ~~comprising~~ comprise at least one of DF-1 and RD-1.

- Claim 179. (currently amended) The method of claim 178 wherein the ~~heat sensitive dyes are~~ near IR absorbing dyes ~~comprising~~ comprise DF-1.

Claim 180. (currently amended) The method of claim 146 wherein the ~~heat sensitive~~ near IR absorbing dyes comprise Heptamethine cyanine dyes having a chemical structure (VIII) as shown below:



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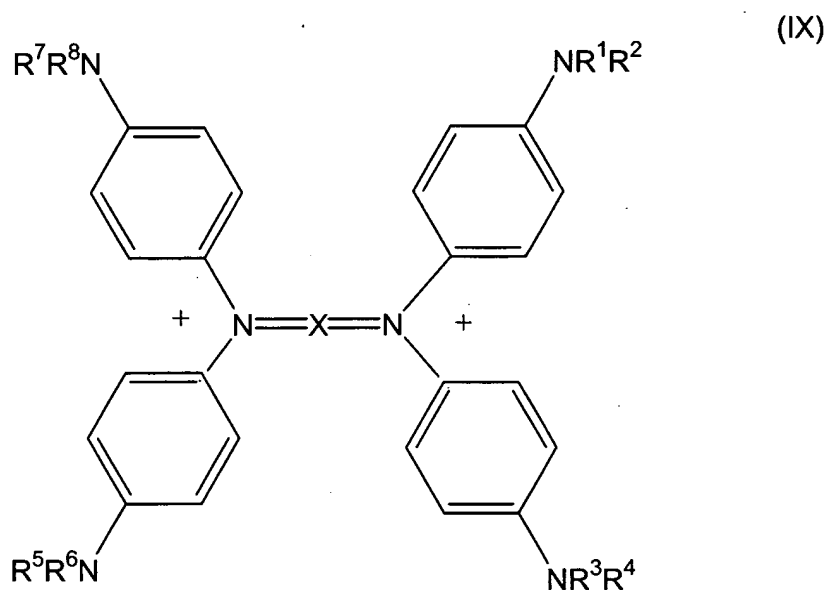
- where R3 can be H, halogen, alkyl, aryl, alkoxy, aryloxy, thioalkyl, or thioaryl; R4 and R5 are independently selected from H, alkyl, aryl, or are bridged to form a cyclic attachment; each of R6 through R13 is independently selected from H, alkyl, aryl, or any two adjacent R6 through R9 and any two adjacent R10 through R13 can form R10 through R13 can form a fused aryl; each of R1 and R2 are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R'' where R', R'' are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each

25



represented by the formula  $CR'R''$  where  $R'$ ,  $R''$  are independently selected from H, C1-C6 alkyl, O, S, Se and Te.

Claim 181. (currently amended) The method of claim 146 wherein the heat  
 5 ~~sensitive near IR absorbing~~ dyes comprise Benzenaminium dyes having  
 structure (IX) as shown below:

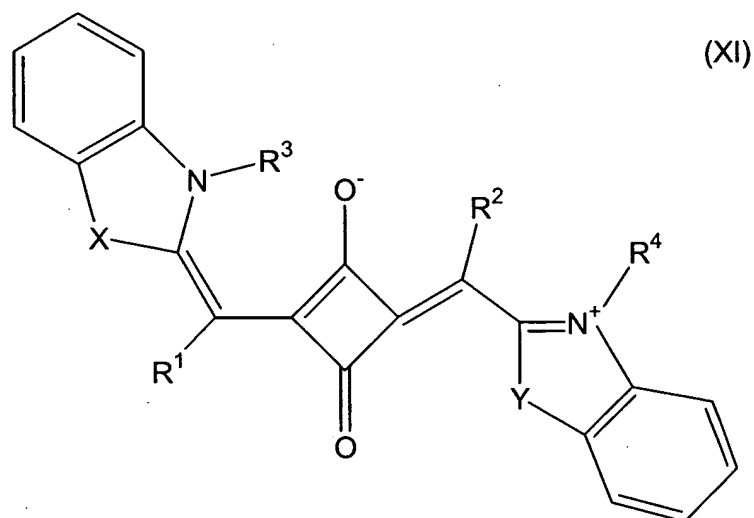
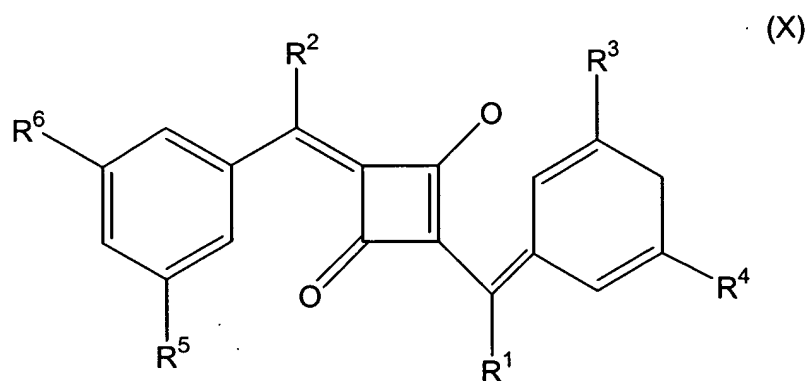


wherein each of  $R^1$  through  $R^8$  is independently selected from C1-C6 alkyl; X  
 is a substituted 1,4-cyclohexadiene.

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Claim 182. (currently amended) The method of claim 146 wherein the heat  
~~sensitive dyes are~~ near IR-absorbing dyes having have structure (X) or struc-  
 ture (XI) as shown below:

15



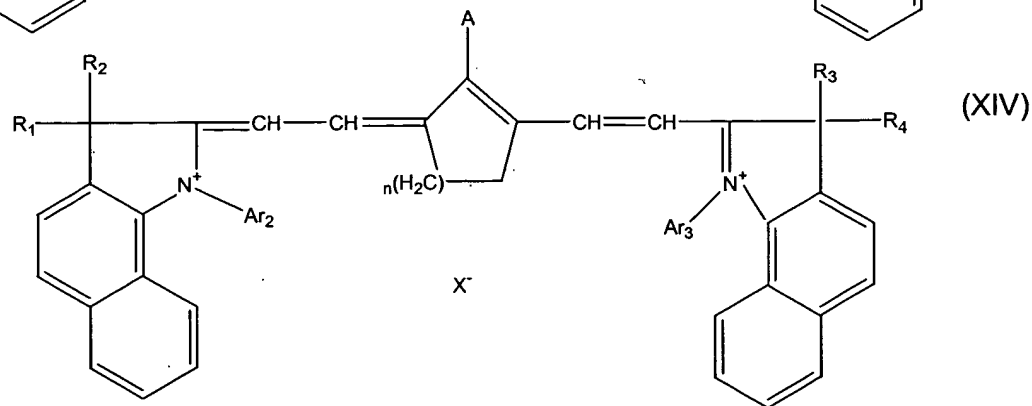
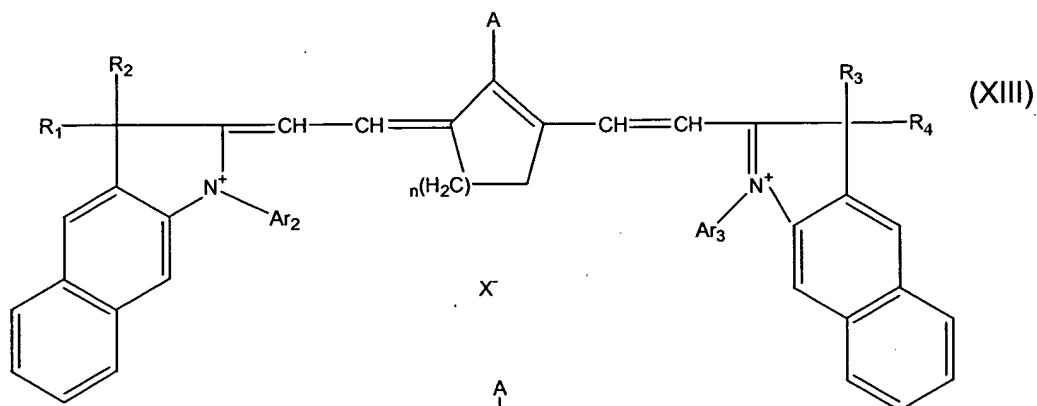
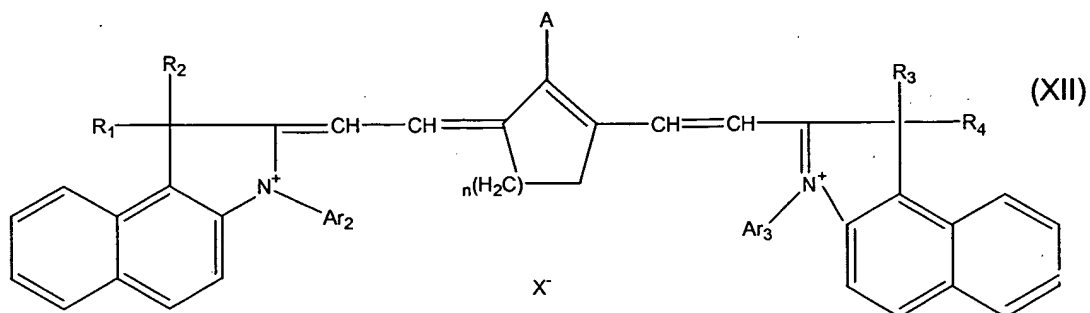
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wherein each of R1 through R6 is independently selected from H, C1-C6 alkyl; X and Y are independently selected from O, S, Se, Te, N-R7, wherein R7 is selected from C1-C6 alkyl and

wherein each of R1 and R2 is independently selected from H, C1-C6 alkyl; each of X and Y is independently selected from O, S, Se, Te, N-R7, wherein R7 is selected from C1-C6 alkyl; each R3 and R4 is independently selected

from alkyl, aryl or substituted alkyl and wherein the benzene rings in structure (XI) may be further substituted.

Claim 183. (currently amended) The method of claim 146 wherein the ~~heat sensitive dyes are~~ near IR-absorbing dyes are selected from the group consisting of:



wherein R1-R4 are independently substituted or unsubstituted C1-C6 alkyl; A is substituted or unsubstituted phenyl, naphthyl, C1-C6 alkyl, or C7-C10 aralkyl; Ar2 and Ar3 are independently substituted or unsubstituted phenyl or naphthyl; X is a monovalent anion; and n is 1 or 2.

Claim 184. (previously presented) The method of claim 183 wherein the alkyl, aryl or aralkyl substitution groups comprise at least one of: hydroxy, alkoxy, chloro, bromo, cyano, and amino.

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Claim 185. (currently amended) The method of claim 146 wherein the ~~heat-sensitive dyes are~~ near IR-absorbing dyes are selected from the group consisting of: 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-1); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-2); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-3); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-4); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-5); 2-((2((3-(((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-6).

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Claim 186. (previously presented) The method of claim 185 wherein the near IR-absorbing dyes comprise at least one of JC-1 and JC-2.

Claim 187. (previously presented) The method of claim 185 wherein the near IR-absorbing dyes comprise JC-1.

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Claim 188. (currently amended) The method of claim 146 wherein the ~~light infrared~~ sensitive and ~~temperature sensitive~~ near-IR absorbing dyes are en-

capsulated in microcapsules, the microcapsules comprising polymers having  $T_g$  from 80°C to 200°C.

5      Claim 189. (previously presented) The method of claim 188 wherein the polymers are selected from the group consisting of polyurethanes, acrylates, styrenes and combinations thereof.

Claim 190. (previously presented)      The method of claim 188 wherein the polymers comprise styrene-butylacrylate-polyethylene glycol acrylate.--

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